

COMMENT

REGULATING INTERNATIONAL TRADE IN LAUNCH SERVICES

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Table of Contents

I.	INTRODUCTION	60
II.	DEVELOPMENT OF A COMPETITIVE LAUNCH SERVICES MARKET	60
	A. Early Commercialization Efforts and Government Policy	60
	B. The Commercial Space Launch Act	61
	C. The Challenger Accident	63
III.	COMPETITION IN LAUNCH SERVICES	63
	A. Supply: The Domestic Launch Industry	64
	B. Supply: Foreign Launch Services	67
	C. Demand for Launch Services	73
	D. Outlook for the Future	76
IV.	POSSIBLE GOVERNMENTAL RESPONSES	79
	A. The Government's Role in Launch Services	79
	B. Industrial Policy	81
	C. Cartelization	85
	D. Use of Existing Trade Regulations	87
	E. GATT Services	98
V.	CONCLUSION	105

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I. INTRODUCTION

In the last half decade, the space transportation market has gone from a highly insular, government controlled and operated set of local monopolies to a fiercely competitive, multipartite international market. But because elements of the previous system still linger in the form of government launch providers, the market will never become freely competitive without an international regime to regulate trade in launch services. This Comment will discuss the development of the market and its present and future dynamics, and will then analyze several alternative regimes for its regulation.

II. DEVELOPMENT OF A COMPETITIVE LAUNCH SERVICES MARKET

A. Early Commercialization Efforts and Government Policy

In the early days of space exploration, space programs were conducted almost exclusively by the public sector with little involvement by the private sector.¹ The purposes of a space program were primarily national security and national prestige; economic benefits were difficult for anyone to capture.² There was little opportunity for commercial use of space as national defense establishments attempted to control leakage of vital technology.³

Gradually, commercial uses of space began to develop,⁴ although space transportation remained an area of government monopoly. In the United States, the government proved inept at meeting the increasing demand. An overly politicized decisionmaking process led NASA to commit the bulk of its resources to the space shuttle, phasing out use of unmanned expendable launch vehicles (ELVs).⁵ However, the shuttle proved not to be an economical launcher of commercial satellites.⁶

1. In the United States, the National Aeronautics and Space Administration (NASA) determined the course of development and contracted with the private sector for particular engineering and construction needs. Corcoran & Beardsley, *The New Space Race*, *Sci. AM.*, July 1990 at 72, 74.

2. Katz, *New Directions Needed in U.S. Space Policy*, in INTERNATIONAL SPACE POLICY: LEGAL, ECONOMIC, AND STRATEGIC OPTIONS FOR THE TWENTIETH CENTURY AND BEYOND 47, 47-48 (D. Papp & J. McIntyre eds. 1987) [hereinafter INTERNATIONAL SPACE POLICY].

3. Jones, *National Security, Technology Transfer Controls, and U.S. Space Policy*, in INTERNATIONAL SPACE POLICY, *supra* note 2, at 65, 66.

4. See *infra* notes 120-29, 140 and accompanying text.

5. See generally, Logsdon, *The Space Shuttle Program: A Policy Failure?*, 232 *SCIENCE* 1099, 1100-1101 (1986).

6. Original 1972 operating cost estimates for the shuttle were \$10.4 million per flight, or \$160 per pound put in orbit. *Id.* at 1102. Those estimates have been drastically revised. More recent estimates of the cost of a shuttle mission dedicated specifically to commercial satellite launching run as high as \$350 million per flight. Corcoran & Beardsley, *supra* note 1, at 74. The price per launch charged by NASA's commercial competitors ranges from

Meanwhile, other countries, particularly in Europe, continued to develop ELV technology. The European consortium Arianespace entered the commercial market in 1980, and it soon became clear that NASA's monopoly on western commercial launches was broken.⁷

Beginning in the early 1980's there was some activity by companies interested in entering the commercial launch market.⁸ In 1982 the Reagan Administration, as part of its general fervor for deregulation, began to encourage the commercialization and privatization of space transportation. On July 4, 1982, President Reagan unveiled his National Space Policy,⁹ which anticipated private sector investment and involvement in the development of launch vehicles.¹⁰ The National Security Council furthered this policy by issuing a comprehensive policy for ELV commercialization on May 16, 1983.¹¹ Nevertheless, companies were slow to invest in commercial launch services, perhaps because all other competitors were either governmental or government-owned.¹²

B. The Commercial Space Launch Act

The Administration continued to express its desire that commercial launch services be privatized,¹³ and Congress acted on this policy in 1984

the \$50 million average of Arianespace, Comment, *Legal Aspects of the Commercialization of Space Transportation Systems*, 3 HIGH TECH. L.J. 99, 105 (1988), to the \$125 million of Martin-Marietta, Kolcum, *Commercial Titan Launch Vehicle Places Two Communications Satellites in Orbit*, AVIATION WK. & SPACE TECH., Jan. 8, 1990, at 42-43. Foreign governmental launchers have been known to undercut commercial prices. See *infra* note 91. Even if NASA launches two satellites per shuttle flight, it will still have to justify the \$50 million to \$125 million premium per satellite by providing vastly superior service. If it cannot do so, it will have to recoup the shortfall by selling off ancillary services to the satellite launchers and other shuttle customers. Thus the shuttle cannot be competitive unless it charges rates below cost.

7. Corcoran & Beardsley, *supra* note 1, at 74-75.

8. See *infra* notes 46-65 and accompanying text.

9. Robinson & Meredith, *Domestic Commercialization of Space: The Current Political Atmosphere*, in 1 AMERICAN ENTERPRISE, THE LAW, AND THE COMMERCIAL USE OF SPACE 1, 4 (1986) [hereinafter AMERICAN ENTERPRISE]

10. *Id.*

11. Dula, *Private Sector Activities in Outer Space*, 19 INT'L LAW. 159, 183 (1985).

12. So long as government launchers are market leaders, pricing will not be indicative of costs, Hertzfeld, *Economic, Market, and Policy Issues of International Launch Vehicle Competition*, in INTERNATIONAL SPACE POLICY, *supra* note 2, at 203, 214, and commercial launchers will probably be forced to price at very low profitability in the short term in order to develop a capacity to compete in the long-term market.

13. One of the actions taken by the administration toward this end was the designation, by Executive Order 12465 on February 24, 1984, of the Department of Transportation as lead agency for the regulation of private ELV launching. The Department of Transportation then created the Office of Commercial Space Transportation to oversee its responsibilities. Robinson & Meredith, *supra* note 9, at 3.

with the Commercial Space Launch Act.¹⁴ The purpose of the Act was to encourage entrepreneurial activity in launch services by providing for licensing requirements,¹⁵ insurance requirements,¹⁶ and the use of government property.¹⁷ The Act also provides for the government to enter international negotiations to encourage fair competition in launch services.¹⁸

Although the Act originally left the details of the insurance requirement to the discretion of the Secretary of Transportation,¹⁹ the 1988 Amendments set out comprehensive regulation of launch insurance.²⁰ The most important part of the insurance section limits the liability of the launcher to \$500 million and requires that the launcher obtain an equal amount of insurance, or the maximum obtainable on the world market, whichever is less, for each launch.²¹ As a condition of this minimum insurance requirement, the government is obligated to require all of its entities and all contractors and subcontractors associated with the launch to file cross-waivers of liability for amounts in excess of the level of insurance.²² These provisions limiting the liability of commercial launchers could add greatly to the confidence of the industry by reducing the risk borne by each launcher, although this will depend on the cost of the insurance required by the Act.²³ Similar limits of liability have been used in the past to encourage the development of nuclear power and aviation.²⁴

The 1988 Amendments to the Act also added provisions meant to encourage research and development. Section 10 of the 1988 Amendments requires NASA, in concert with representatives of the satellite and commercial launch industries, to develop a program to encourage research and development of advanced launch technologies with higher performance and lower costs.²⁵ This program would make these advances available to both government and commercial launch systems.

14. Commercial Space Launch Act, Pub. L. No. 98-575, 98 Stat. 3055, amended by Commercial Space Launch Act Amendments of 1988, Pub. L. No. 100-657, 102 Stat. 3900 (codified as amended at 49 U.S.C. §§ 2601-2623 (1988)).

15. 49 U.S.C. §§ 2605-2613 (1988).

16. *Id.* § 2615.

17. *Id.* § 2614.

18. *Id.* See *infra* note 315 and accompanying text.

19. Commercial Space Launch Act, Pub. L. No. 98-575, § 16, 98 Stat. 3055 (1984).

20. *Id.*, as amended by Commercial Space Launch Act Amendments of 1988, Pub. L. No. 100-657, § 5, 102 Stat. 3900, 3902 (codified as amended at 49 U.S.C. § 2615 (1988)).

21. 49 U.S.C. § 2615(a)(1)(A) (1988).

22. *Id.* § 2615(a)(1)(D).

23. See *infra* note 62 and accompanying text.

24. See *infra* notes 181-82 and accompanying text.

25. Commercial Space Launch Act Amendments of 1988, Pub. L. No. 100-657, § 10, 102 Stat. 3900, 3907 (1988).

The Act also provides that the government facilitate the use of excess capacity at government launch sites through sale or lease at fair market value.²⁶ For the use of launch services, the government is to charge only "direct costs," meaning those additional costs incurred solely because of the commercial launch.²⁷

C. The Challenger Accident

While the enactment of the Commercial Space Launch Act has done much to encourage the growth of a commercial launch industry, another important development has been the change in United States space policy resulting from the loss of the Challenger space shuttle on January 28, 1986. The Challenger accident led NASA to redesign the space shuttle and reassess costs,²⁸ which in turn led the government to change its policy from active involvement in marketing launch services to removing itself from the commercial launch market.²⁹ This withdrawal of U.S. government competition has finally allowed private American ventures to develop.

III. COMPETITION IN LAUNCH SERVICES

As American commercial ventures have moved into the area of providing commercial launch services, a number of foreign ventures have done the same, and foreign governments have continued to develop their own launch systems. All must compete in the same market of users of launch services. The market is not a truly open one, since a great deal of business comes from government entities that are constrained in their choice of launchers. Many governments also limit private customers' use of foreign launchers. A segment of the market for international launch services is highly competitive; however, this segment cannot be adequately understood without analyzing the less competitive sectors of the market as well.

26. 49 U.S.C. § 2614(a), (b) (1988).

27. *Id.* § 2614(b)(1). The Air Force's draft agreement for commercial use of government launch facilities was assaulted at House hearings by the commercial launch industry as overly burdensome. *State of the Commercial Launch Industry: Hearings Before the Subcomm. on Space Science and Applications of the House Comm. on Science, Space, and Technology*, 100th Cong., 1st Sess. (1987) [hereinafter *Hearings*]. The Air Force has since produced another draft of its agreement. Department of the Air Force, *Model Expendable Launch Vehicle Commercialization Agreement: Revision Two* (May 12, 1989). For a discussion of the original model agreement, see Comment, *supra* note 6, at 116.

28. See OFFICE OF TECH. ASSESSMENT, *LAUNCH OPTIONS FOR THE FUTURE* x (1988).

29. Comment, *supra* note 6, at 103.

A. Supply: The Domestic Launch Industry

The supply of launch services may be divided into two relevant sectors: domestic suppliers and foreign suppliers. The domestic sector is further subdivided into both public and private suppliers. For practical purposes, the purely public sector in the United States has ceased to operate, although NASA remains on the fringe of the market as a potential competitor should United States space policy change.³⁰ At least for the time being, responsibility for commercial launches has been passed to private launch providers.³¹ The private sector will therefore be the primary area of concern of this Comment. The private sector is itself divided into two subsectors based on the size of the companies involved and the technology available to them. The first group is composed of large firms relying on old rocket technology developed in ICBM or NASA programs; the second is composed of small start-up corporations created to develop new technology specifically aimed at the commercial launch industry.³²

1. DEFENSE AND NASA CONTRACTORS

The private commercial launch industry is still in its infancy in the United States.³³ The major American players, as yet, are the defense and NASA contractors that developed early rocket technology in the 1950's and continue to produce rockets for government use.³⁴ They are the only American companies presently able to lift payloads into geosynchronous transfer orbit (GTO),³⁵ a necessary prerequisite for competition in the most developed sector of launch service demand: the placement in orbit of large communications satellites. These contractors include General

30. The United States has not announced a policy with respect to providing commercial services of which only the space shuttle is capable, such as satellite recovery.

31. Kolcum, *Joint Atlas Centaur Mission Orbits FltSatCom Spacecraft*, AVIATION WK. & SPACE TECH., Oct. 2, 1989 at 23 (reporting launch of last government-commercial joint venture).

32. Reynolds & Merges, *Toward an Industrial Policy for Outer Space: Problems and Prospects of the Commercial Launch Industry*, 29 JURIMETRICS J. 7, 13 (1988).

33. The first successful commercial launch was the launch of a Delta from Cape Canaveral on August 27, 1989. Kolcum, *U.S. Reenters Commercial Launch Arena With Private Delta Mission*, AVIATION WK. & SPACE TECH., Sept. 4, 1989, at 24.

34. OFFICE OF TECH. ASSESSMENT, INTERNATIONAL COOPERATION & COMPETITION IN CIVILIAN SPACE ACTIVITIES 104-06. (1985).

35. Corcoran & Beardsley, *supra* note 1, at 74-75.

Dynamics with the Atlas launch vehicle,³⁶ McDonnell-Douglas with the Delta,³⁷ and Martin-Marietta with the Titan.³⁸

Of the three launch systems, the Commercial Titan possesses an advantage of large payload capacity, which allows it to easily carry two satellites or carry single satellite payloads that are too large for other vehicles.³⁹ The development of the Titan IV vehicle for the United States Air Force⁴⁰ also gives Martin-Marietta tremendous economies of scale because the same production facilities can be used in the manufacture of the Commercial Titan. General Dynamics has developed a configuration which allows three smaller satellites to be launched into low earth orbit by a single Atlas,⁴¹ which could give it a significant advantage in the small payload market.⁴²

A challenge for domestic commercial launch firms will be to keep their launch technology up to date. Without any government contracts, the firms will have to initiate their own research and development to improve on the archaic systems presently in use.⁴³ Some effort is already under way with programs such as the Titan IV.⁴⁴ However, large American aerospace corporations have been criticized for not taking a more aggressive approach to financing leading-edge space commercialization efforts.⁴⁵ The need for entrepreneurial efforts, therefore, has been filled by smaller companies.

36. The capacity of the Atlas to GTO is 2250 kg. Corcoran & Beardsley, *supra* note 1, at 75. The Atlas is an adequate competitor for single satellite launches, but is not large enough to handle double payloads. General Dynamics plans to produce Atlas rockets at the rate of eight per year through 1997, and has commitments to launch about half of them. Kolcum, *supra* note 31, at 23.

37. The payload capacity to GTO of the Delta II is 1800 kg, Corcoran & Beardsley, *supra* note 1, at 75, which might not be sufficient as demand in the 1990's shifts to larger satellites, see Dornheim; *Near-Term Launch Market Looks Bright, but Questions Remain on Future Prospects*, AVIATION WK. & SPACE TECH., Dec. 19, 1988, at 73. It has a fine record of success with 11 launches in 1990. *Laurels 1990*, AVIATION WK. & SPACE TECH., Jan. 7, 1991, at 11, 12.

38. The Commercial Titan has a payload capacity of 5625 kg to GTO, three times that of the Delta and more than twice that of the Atlas. Corcoran & Beardsley, *supra* note 1, at 75. Martin-Marietta has successfully launched two out of three Commercial Titans. Kolcum, *Intelsat F6 Orbiting by Commercial Titan Will Ease Communications Congestion*, AVIATION WK. & SPACE TECH., July 2, 1990, at 25.

39. Kolcum, *supra* note 6, at 42, 43. The Titan's payload capacity to low Earth orbit (LEO) is 14,400 kg (17,700 kg for the Titan IV), Corcoran & Beardsley, *supra* note 1, at 75, which makes the Commercial Titan an attractive alternative to the space shuttle for lifting such large payloads as components of the space station, Kolcum, *supra* note 6, at 42-43.

40. The Air Force has given Martin-Marietta a firm commitment for 41 launches in the 1990's. Corcoran & Beardsley, *supra* note 1, at 75.

41. *Single Atlas to Launch Three Small Satellites*, AVIATION WK. & SPACE TECH., Mar. 26, 1990, at 24.

42. See *infra* notes 125-29 and accompanying text.

43. Reynolds & Merges, *supra* note 32, at 17.

44. R. Truly, *SPACE SHUTTLE: THE JOURNEY CONTINUES* 17 (1988).

45. See Asker, *Failure to Support Space Ventures Threatens U.S. Aerospace Industry*, AVIATION WK. & SPACE TECH., May 28, 1990, at 22.

2. SMALL PAYLOAD LAUNCH SERVICES

Presently in the United States there are a number of smaller ventures interested in the market for commercial launch services. Five are start-up efforts: E'Prime Aerospace Corp.,⁴⁶ Conatec, Inc.,⁴⁷ Space Services, Inc. (SSI),⁴⁸ American Rocket Company (Amroc),⁴⁹ and a joint venture between Orbital Sciences Corporation (OSC) and Hercules.⁵⁰ In addition to the start-ups, there is one established small payload launcher, LTV Aerospace, which developed the Scout launcher for the government.⁵¹

The start-up companies present a strong contrast to the major launch corporations. They are in many ways more innovative, building brand new rockets from the ground up, or using old technology in new ways.⁵² OSC/Hercules, for example, has launched its Pegasus rocket from a B-52,⁵³ and Amroc has attempted a sea launch of its Dolphin rocket.⁵⁴ Despite the creativity of the start-ups, their market is limited because they cannot compete in the highly lucrative communications

46. E'Prime is hoping to use Peacekeeper missiles as the basis for its launch system. Corcoran & Beardsley, *supra* note 1, at 82-84.

47. Conatec is offering suborbital launches of sounding rockets to carry microgravity experiments. *Hearings*, *supra* note 27, at 16 (statement of Eugene Kadar, President of Conatec).

48. SSI was the first small company to demonstrate its launch capabilities with a suborbital flight of its Conestoga rocket in 1982. Corcoran & Beardsley, *supra* note 1, at 82. SSI has not yet had a successful test flight of a booster capable of putting a payload into LEO.

49. Amroc, previously known as Starstruck, has had great difficulty in developing its own rocket. Dornheim, *Amroc Retains Key Personnel Despite Cutbacks After Pad Fire*, AVIATION WK. & SPACE TECH., Oct. 30, 1989, at 20. However, Amroc is continuing to develop its new Aquila booster. Marketing efforts are under way and Amroc anticipates testing Aquila within the next few years, with commercial launches to follow shortly. Telephone interview with James Bennett, President of the American Rocket Company (Apr. 15, 1991).

50. The company's Pegasus rocket has been launched twice from an airborne B-52. *Second Pegasus Launched Successfully; Small Satellites in Elliptical Orbit*, AVIATION WK. & SPACE TECH., July 22, 1991, at 24. For Pegasus to be commercially viable, OSC/Hercules must obtain a commercial aircraft since the B-52 is available only for governmental launches. Stavro, *Virginia Firm Uses a B-52 to Launch Satellites*, L.A. Times, Apr. 6, 1990, at D1, D7. Orbital Sciences has managed to capture one commercial payload already; Sweden has chosen Pegasus for its December 1992 launch of its 230 kg Freja satellite. *Sweden Reserves Space on Pegasus for Payload First Booked on Long March*, AVIATION WK. & SPACE TECH., Jan. 1, 1990, at 38 [hereinafter *Sweden Reserves Space*].

51. The Scout has a payload capacity of 215 kg to LEO. Corcoran & Beardsley, *supra* note 1, at 74. It had been launched 112 times through the end of 1988, with a 95.5% success rate. Scott, *Small-Payload Launch Companies Struggle to Define Their Market*, AVIATION WK. & SPACE TECH., Dec. 19, 1988, at 79, 82.

52. See Reynolds & Merges, *supra* note 32, at 17.

53. See *supra* note 50.

54. Sea launching, used for ballistic missiles, had never before been used to launch a rocket into space. Martin, *Space, Inc.*, SCI. DIG., March 1985, at 43, 49.

satellite market,⁵⁵ and they have few long-term purchase contracts.⁵⁶ They have had to compensate for this deficit with aggressive marketing. OSC, for example, has retained Arianespace as its European marketing agent,⁵⁷ and has recently concluded a marketing agreement for Japan with Okura & Co., Ltd.⁵⁸ SSI submitted a proposal to the Department of Transportation to launch cremated human remains into space.⁵⁹ OSC has also made a public stock offering,⁶⁰ which should help give it an edge in an area where there is a dearth of capital.⁶¹

The small payload sector of the launch industry is enthusiastic, innovative, and quite capable of producing many useful, reasonably priced launchers. Small payload launchers are extremely vulnerable to launch failures, however. One failure could decimate the company's available capital, and even with reliable launchers, insurance rates could be too high for the smaller companies to afford.⁶² Small payload launchers can be successful by emulating the large payload launchers' use of government contracts as the basis of their launch business.⁶³ They must also stress their abilities in areas in which they possess a cost advantage by encouraging the development of technologies that use lighter payloads, such as "lightsat" technology⁶⁴ and the use of reentry modules for microgravity experiments.⁶⁵

B. Supply: Foreign Launch Services

Domestic providers of launch services face competition from a number of foreign suppliers. Even before the Challenger accident, foreign launchers were beginning to enter the international launch market. Governments have developed launch systems for a variety of reasons. France has tended to view its space program as essential to its national security, while Japan and Germany view their space programs as essential investments in leading edge technology.⁶⁶ Many developing countries also believe that an adequate space program will save money

55. Reynolds & Merges, *supra* note 32, at 17. See also Kolcum, *supra* note 31.

56. Many of the small payload companies do, however, receive some form of government support. Scott, *supra* note 51, at 79.

57. Sweden Reserves Space, *supra* note 50, at 38.

58. Pegasus Maker Readies Pacific Sales Push, AVIATION WK. & SPACE TECH., Feb. 11, 1991, at 26.

59. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 121.

60. Asker, *Orbital Sciences Becomes First Commercial Space Firm to Go Public*, AVIATION WK. & SPACE TECH., Apr. 30, 1990, at 27.

61. Asker, *supra* note 45, at 23.

62. Asker, *Insurance Will Cost More, but Little Movement is Seen to U.S. Launchers*, AVIATION WK. & SPACE TECH., Mar. 5, 1990, at 21.

63. See Corcoran & Beardsley, *supra* note 1, at 84.

64. See *infra* note 128.

65. See *infra* note 127.

66. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 125.

by preventing exploitation by the developed world, making it well worth the actual investment of capital.⁶⁷

The development of foreign space programs and their eventual entry into the commercial launch industry has had a profound effect on the shape of the market. From 1983 to 1985, foreign launchers provided only one-half to one shuttle equivalent per year to American users.⁶⁸ Since the Challenger accident, foreign launchers have capitalized on the U.S. standdown to develop the capability to supply six to ten shuttle equivalents per year through the rest of the 1990's.⁶⁹

1. EUROPE AND CANADA

European space efforts resulted partly from dissatisfaction with NASA treatment of cooperative space ventures.⁷⁰ Indeed, the European Space Agency (ESA), in keeping with its criticism of NASA's failure to separate the commercial and research elements of its program,⁷¹ transferred its launch services to the French corporation Arianespace in March 1980.⁷² Since then, the ESA has continued to advocate that NASA return to a more research-oriented role.⁷³

A variety of factors have made Arianespace a leader in the provision of commercial launch services.⁷⁴ Their launchers have been very reliable. Until a recent failure, Arianespace had successfully launched a total of seventeen rockets⁷⁵ and has since recovered to launch

67. See Levine, *Commercialization of Space: Implications for U.S. Relations with Developing Countries*, in INTERNATIONAL SPACE POLICY *supra* note 2, at 119, 119-20.

68. CONGRESSIONAL BUDGET OFFICE, SETTING SPACE TRANSPORTATION POLICY FOR THE 1990's 12 (1986).

69. *Id.* at 23. Original NASA estimates predicted that foreign launchers would capture only 25% of the total world market because of shuttle dominance. Due to the Challenger launch standdown, the figure is well over 50%, and the shuttle's share of commercial business is non-existent. *Id.*

70. See Johnson-Freese, *High Tech, High Cost: Reasons for Cooperation in Space?*, in INTERNATIONAL SPACE POLICY *supra* note 2, at 217, 221-25 (discussing U.S.-European cooperative space efforts).

71. See *id.* at 224. The criticism is at times quite vocal. Charles Bigot, the managing director of Arianespace described NASA's approach to clients as that of "a lord accepting peasants on his land." Corcoran & Beardsley, *supra* note 1, at 75.

72. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 111-16. Although still substantially owned by the various European national space agencies, *id.*, Arianespace has been run as an independent corporation, keeping the ESA out of the day-to-day administration of the launch business, Corcoran & Beardsley, *supra* note 1, at 74-75.

73. Johnson-Freese, *supra* note 70, at 224.

74. Arianespace launched its first commercial rocket, an Ariane 1, on May 23, 1984, OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 110, giving NASA its first legitimate competitor. Arianespace now uses the Ariane 4, which is capable of carrying up to 4200 kg to GTO. Corcoran & Beardsley, *supra* note 1, at 75. The location of its Kourou, French Guiana facility near the equator gives Arianespace an advantage in lifting payloads into some orbits. CONGRESSIONAL BUDGET OFFICE, *supra* note 68, at 30-33.

75. Lenorovitz, *Inquiry Team Probes Cause of Ariane First-Stage Failure*, AVIATION WK. & SPACE TECH., Mar. 5, 1990, at 18, 19.

three more through mid-1991.⁷⁶ Even given the most recent launch failure, Arianespace is the clear market leader in launch services, with over half of all contracts for future launches.⁷⁷ To fortify its position, the company has concluded four "framework" agreements with European subcontractors for the production of 50 additional Ariane 4 launchers over the next eight years,⁷⁸ giving Arianespace the same economies of scale that American launchers achieve through government contracts. In addition, Arianespace has maintained a creative and aggressive marketing strategy, accepting equity rather than cash in some cases, and helping customers obtain insurance.⁷⁹ As a result of these advantages, Arianespace already commands more than half of the commercial launch market⁸⁰ and should remain a potent competitor throughout the low demand period of the 1990's.⁸¹

Because of the dominance of Arianespace, private efforts in Europe have lagged behind those in the United States. Orbital Transport-und-Raketen Aktiengesellschaft (Otrag) of Germany has been interested in commercial launching since the late 1970's, but has had difficulty finding a launch site.⁸² The only other private corporations that have expressed interest in the commercial launch industry are Bristol Aerospace, Ltd. of Canada⁸³ and SovCan Star Satellite Communications, Inc., a joint venture between Canadian and Soviet corporations.⁸⁴

76. Lenorovitz, *Ariane V44 Mission Delayed For Third-Stage Modification*, AVIATION WK. & SPACE TECH., June 3, 1991, at 21.

77. *Arianespace Expects to Sign New Launch Contracts Despite V36 Launch Failure*, AVIATION WK. & SPACE TECH., Mar. 19, 1990, at 191 [hereinafter *New Launch Contracts*].

78. *Arianespace Racks up Launch Business: Ariane 5 Set for Launch in 1995* (advertiser sponsored market supplement), AVIATION WK. & SPACE TECH., Nov. 27, 1989, at S4.

79. Raclin, *Going to Work in Space: A Survey of Presently Available Launch Systems*, 1 AMERICAN ENTERPRISE, *supra* note 9, at 30, 47. Practices similar to these ultimately led Transpace Carriers, Inc. to pursue Section 301 relief based on allegations of two-tier pricing. *Id.* See also *infra* notes 261-65 and accompanying text.

80. *Ariane Will Broaden Launch Services to Counter Competition*, AVIATION WK. & SPACE TECH., Sept. 3, 1990, at 100.

81. Arianespace has such a strong international reputation among launch services customers that its February 22, 1990 failure did not impair any of its current contract negotiations. Arianespace concluded an important contract with Hughes Communications, Inc., one of the leaders in satellite production, immediately following the failure. *New Launch Contracts*, *supra* note 77, at 191. Recent Arianespace innovations include the development of a small payload module. Lenorovitz, *Commercial Flight Slots Offered for Auxiliary Payloads on Ariane*, AVIATION WK. & SPACE TECH., Feb 5, 1990, and the Ariane 5, which represents a 50% increase in capacity to GTO over its predecessor, the Ariane 4, R. TRULY, *supra* note 45, at 16. This development will also allow Arianespace to be more competitive with the Titan in the market for very large satellites. See *supra* notes 39-40 and accompanying text.

82. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 122.

83. Bristol had planned to develop a rocket capable of carrying 8000 pounds to LEO and 1700 pound to GTO by 1988. *Id.*

84. Hughes, *Soviet-Canadian Joint Venture to Design, Launch Satellites*, AVIATION WK. & SPACE TECH., Nov. 12, 1990, at 77, 79.

2. JAPAN

Japan's H-I launcher was developed from American Delta technology, and thus is burdened with a requirement that it not be used for commercial launches.⁸⁵ Japan is developing its H-II rocket from indigenous technology, however, so similar restrictions will not be placed on its use.⁸⁶ When the H-II is completed in 1993, the Japanese will likely become a major competitor in launch services.⁸⁷ Japan could be hindered by the limited availability of its launch facility, however, which can only be used for two 45-day periods every year.⁸⁸ Not only might this reduce Japan's ability to provide reliable, on-time launch services, but the development of the program as a whole could be slowed if any of the launch windows are wasted.

3. CHINA

The Chinese, who launched their first satellite in 1970,⁸⁹ have recently become involved in the commercial launch business as well. They are marketing launches to GTO on their Long March 3 and Long March 4 rockets⁹⁰ and have attracted several customers with their low prices.⁹¹ These low prices are offset somewhat, however, because commercial launchers face additional preparation costs not incurred when launching from more advanced Western launch sites.⁹² Although Chinese launches of American satellites are subject to strict export licensing requirements,⁹³ the Bush Administration recently approved

85. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 120.

86. *Id.* The H-II will have the capability to lift a 2000 kg satellite to GTO, as compared with around 500 kg for the H-I. Swinbanks, *Engine Problems Shake Japan's Space Plans*, 340 NATURE 253 (1989).

87. Swinbanks, *supra* note 86, at 253. Recent problems with the engines of the H-II, have led to the delay of its first launch by a year. *Japanese Consider Further Changes in H-2 Booster's Rocket Engine*, AVIATION WK. & SPACE TECH., Oct. 15, 1990, at 30. Shortly after the H-II is ready, it will be complemented by reentry module currently under development. The module, which will allow an 800 kg payload to be exposed to up to seven days of microgravity before being returned to Earth, will give Japan an advantage in materials processing and with scientific customers. *Japan Reschedules H-1 Mission After Launch Pad Abort*, AVIATION WK. & SPACE TECH., Sept. 4, 1989, at 23.

88. Swinbanks, *First Setback for Japan*, 340 NATURE 493 (1989).

89. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 120.

90. The Long March 3 has a payload capacity of 1400 kg to GTO, and the Long March 4 a capacity of 2500 kg into sun synchronous orbit. Corcoran & Beardsley, *supra* note 1, at 75. As for reliability, the Chinese claim that the Long March family of boosters has produced only two failures in twenty-two launches, the last in January 1984. Proctor, *China Returns Salvaged Spacecraft to Orbit*, AVIATION WK. & SPACE TECH., Apr. 16, 1990, at 25.

91. The price for the April 7, 1990 launch by the Long March of the Asiasat 1 communications satellite was also approximately \$30 million. Proctor, *supra* note 90, at 28. This price was probably introductory in nature.

92. *Id.* at 28.

93. See *infra* notes 272-314 and accompanying text.

licenses for three satellites. The Department of Transportation's Office of Commercial Space Transportation has expressed concern, however, that the pricing of Chinese launch services and the high number of launches violate a January 1989 agreement limiting China to nine commercial launches over the next six years and requiring pricing at market rates.⁹⁴ China can use its ever-expanding role in the launch market as an excellent way to generate foreign exchange, so long as America and other satellite producing countries allow export for launch in China.

4. THE SOVIET UNION

The Soviet Union is also interested in the ability of commercial launch opportunities to generate hard currency. The Soviets have launched several satellites for other governments⁹⁵ and have been interested in the commercial market since 1983.⁹⁶ The Soviets may find it difficult to sell launch services to commercial users from the United States; U.S. export control regulations pose an even greater barrier for the Soviets than for the Chinese.⁹⁷ Nevertheless, the Soviets are aggressively marketing the services of their Proton launcher and the other elements of their space program.⁹⁸

The Soviets have a broad range of available launch vehicles,⁹⁹ and other than NASA, they are the only competitor capable of providing full-

94. *Chinese Deal to Launch Arabsat Renews U.S. Concerns About Long March Pricing*, AVIATION WK. & SPACE TECH., Apr. 9, 1990, at 25 [hereinafter *Chinese Deal to Launch Arabsat*]. The Department of Transportation believes that the American commercial market cannot bear more than the nine allotted Chinese launches without crossing the "pain threshold." *Id.* See also *infra* note 265 and accompanying text.

95. As of 1989, the Soviets had launched a total of nine foreign satellites: four Indian, three French, and one each for Czechoslovakia and Bulgaria. GLAVKOSMOS, COMMERCIAL USES OF SPACE EXPLORATION 12 [author's pagination, actual pages not numbered] (1989) (Glavkosmos marketing brochure)

96. The Soviets first bid to provide commercial launch services for the launch of the Inmarsat communications satellite occurred in 1983. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 117.

97. This is because of the "China Green Line," discussed *infra* at note 297.

98. Already a German firm has taken advantage of Glavkosmos' low rates to launch the first of a series of five experiments on a Soviet Proton, and the Energetics Corporation of the U.S. has responded to flexible terms by Glavkosmos by concluding a \$54 million agreement to carry up to eight Energetics experiments as secondary payloads on future Proton launches. Asker, *Glavkosmos Signs Energetics as First U.S. Launch Customer*, AVIATION WK. & SPACE TECH., Nov. 20, 1989, at 40.

99. In addition to the Proton, which is capable of launching 21,000 kg into LEO, and 2200 kg to GTO, the Soviets are also offering for commercial launches the Vostock booster (for sun-synchronous payloads up to 1840 kg), the Soyuz (for LEO payloads up to 6900 kg), the Molnia (to place payloads of up to 1800 kg into highly elliptical orbits), and the Tsiklon (4000 kg to LEO). GLAVKOSMOS, *supra* note 95, at 13-21. The Soviets also possess the largest available rocket, the Energia, which can launch up to 105 metric tons to LEO. Corcoran & Beardsley, *supra* note 1, at 74-75.

service space transportation.¹⁰⁰ Indeed, the first American company to receive an export license to use a Soviet launcher went to the Soviets precisely because of their ability to provide long-duration exposure to microgravity.¹⁰¹ The Soviets have also shown innovation in developing portable commercial launchers.¹⁰² However, to be truly successful in the international market, the Soviets will need to allow greater customer access to their production facilities so that customers can better analyze the quality of the launchers before entering into launch contracts.¹⁰³

5. BRAZIL AND INDIA

For the time being, Brazil and India are only marginal players in commercial launch services and will probably remain so in the near future. India presently possesses the capability to launch satellites into orbit,¹⁰⁴ and Brazil anticipates the launch of its own rocket in 1992.¹⁰⁵ Although both countries have had recent difficulties that may make them hesitant to undertake the risks of commercial launching,¹⁰⁶ their ability to launch for themselves could lead them to avoid seeking commercial launch services on the open market.¹⁰⁷

100. The Energia arm of the Soviet space program is mounting a marketing campaign parallel to that of Glavkosmos. *Energia Group Offers Commercial Services*, AVIATION WK. & SPACE TECH., Sept. 18, 1989, at 28. Energia offers the use of the Mir space station, as well as Soyuz manned flights and long-duration missions. *Id.* Soviet advantages in this area include human monitoring and adjustment of experiments as they progress, as well as a four-day turnaround from when an experiment is delivered in Moscow until it is unpacked on the Mir station, which could be a tremendous advantage for less stable payloads. GLAVKOSMOS, *supra* note 95, at 30-37.

101. See Asker, *Crystal Experiments on Mir Signal Soviet Commercial Space Push*, AVIATION WK. & SPACE TECH., Apr. 2, 1990, at 28. The Soviets are building on their already formidable advantage in materials processing by adding a large new materials processing module to the Mir station. Covault, *Soviet Mir Cosmonauts Await Launch of Large Materials Processing Module*, AVIATION WK. & SPACE TECH., Apr. 23, 1990, at 27.

102. *Laser-for-Burger Swaps*, ECONOMIST, Mar. 3, 1990, at 78, 80. This type of launcher presents an interesting dilemma for regulating trade in launchers, since the launcher would be moving through international commerce as a good rather than as a service. See generally *infra* notes 204-70 and accompanying text.

103. The Soviets have already increased the vertical integration of information within their space program. Lenorovitz, *Soviet Space Program Reflects New Policies Initiated by Gorbachev*, AVIATION WK. & SPACE TECH., Dec. 18, 1989, at 52, 57. This openness will lead to better quality control and more comprehensive decision making. *Id.*

104. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 120.

105. Although Brazil had successfully launched 130 pounds aboard its Sonda III rocket to an altitude of 380 miles on a suborbital flight, *id.*, its program has progressed little since that time, Neto, *Brazil's Two-Thirds VLS Success*, 339 NATURE 329 (1989).

106. See Neto, *supra* note 105, at 329; Jayaraman, *Indian Launch Vehicle Grounded*, 340 NATURE 587 (1989).

107. Brazil has already shown this inclination, preferring to wait for the development of an indigenous launcher before launching its already completed Data Collection Satellite (SCD-1). Neto, *supra* note 105, at 329.

6. OTHERS

Most of the other countries that are developing rocket technology are doing so because of its military potential and are therefore concerned more with ballistic missiles, which need not be as powerful as rockets that attain low earth orbit.¹⁰⁸ Commercial programs, although internationally more respectable than military ones, will probably not be looked on with much favor by the major powers, especially since Iraq demonstrated the power even a rudimentary rocket program could provide.¹⁰⁹

Other countries are attempting to enter the commercial launch market by providing launch sites. Australia has chosen to cooperate with the space powers by developing its own commercial spaceport at Cape York, Queensland,¹¹⁰ and Mexico was the site of a recent launch for the Spaceport Florida Authority.¹¹¹

C. Demand for Launch Services

Unlike the supply of launch services, which underwent a veritable explosion in the late 1980's and early 1990's, demand for launch services has remained static. This is a troubling development for the many companies attempting to enter the commercial market in the 1990's. Demand for launch services comes from two different sectors: public sector users and commercial users. Demand in these sectors is motivated by different factors. In order to analyze the commercial viability of

108. In addition to Brazil and India, 13 developing or newly industrialized countries (Argentina, Egypt, Indonesia, Iraq, Israel, Libya, Mexico, Pakistan, Peru, the Philippines, South Africa, South Korea, and Taiwan) have rocket development programs driven by the desire to gain prestige through technological independence, and in many cases by the desire to improve national security. Karp, *The Commercialization of Space Technology and the Spread of Ballistic Missiles*, in *INTERNATIONAL SPACE POLICY*, *supra* note 2, at 179, 181.

109. See Smith, *Scud Propulsion Designs Help Patriot System Succeed*, *AVIATION WK. & SPACE TECH.*, Jan. 28, 1991, at 28.

110. The spaceport will be available to all launchers. The Soviet Union is particularly interested in the Cape York program because it provides access to equatorial launching, which is less expensive. The Soviets were scheduled to begin launches in 1992, but the program ran into trouble when Australia was told by COCOM (the NATO Coordinating Committee on East-West trade policy) that any use of the facility by the Soviets might prevent its use by COCOM members, due to concerns over technology transfer. Ewing, *Queensland's Space Base Threatened*, 339 *NATURE* 650 (1989). The project depends a great deal on the accession of U.S. policymakers, as the denial of export licenses for either construction equipment or satellites could prove fatal to the project. Asker, *Australians Pitch Cape York Complex as Best Way to Ease Soviets into Launch Market*, *AVIATION WK. & SPACE TECH.*, Apr. 9, 1990, at 25. There has been some progress: on August 22, 1990, President Bush authorized the State Department to allow an American company's satellites to be launched at Cape York. *President Authorizes U.S. Participation in Australian-USSR Space Launch Venture*, 7 *Int'l Trade Rep.* 1326 (Aug. 29, 1990) [hereinafter *President Authorizes U.S. Participation*].

111. *New Spaceport to Conduct First Launch from Mexico*, *AVIATION WK. & SPACE TECH.*, June 3, 1991, at 21.

domestic and foreign launchers, it is necessary to understand the factors that drive competition in each area of demand.

1. PUBLIC SECTOR USERS

Public sector users of launch services include any users that are under government control and may thereby be compelled to use a governmental launch system.¹¹² Some of these are civilian users, such as national space agencies, weather services, research institutions and other government-supported scientific endeavors; others are national security users, such as defense departments, that have a variety of needs ranging from early warning, communications and spy satellites to space-based weapons programs.

Public sector users could account for as much as 75% of demand through at least the mid-1990's;¹¹³ however, it is unlikely that private launchers will be able to capture a significant share of this market, even where private launching is more economically efficient. Although the cost of launching may enter into government calculations when developing a launch system,¹¹⁴ once funds have been expended to bring a launch system to maturity, public sector users will usually be compelled to use the government system, regardless of cost.¹¹⁵ The overwhelming importance of non-economic factors in the governmental sector of demand make price of much less concern. This is because a government will take into consideration the same concerns for national security and national prestige that motivated its desire to develop a launch program in the first place.¹¹⁶

Although public sector users may often be unable to use private launch systems, they can still have a beneficial effect on such systems. By limiting their consideration of non-economic factors to situations wherein those factors are pertinent, and by purchasing the remainder of their launch services from commercial providers, public sector users can increase demand for private launch services enough to make commercial launching feasible. With an assured level of demand from public sector

112. This Comment includes in the public sector of demand only those countries that are able to provide their own launch services and thus avoid seeking launch services on the commercial launch market. The demand of those countries which do not possess launch capabilities are included in commercial demand.

113. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 122.

114. See Logsdon, *supra* note 5 (discussing the various considerations, including cost, in developing the space shuttle as the United States' primary launch vehicle).

115. Indeed, the United States pursued this policy of using governmental payloads to subsidize the commercial prices charged by NASA to maintain its market share in the face of competition from Arianespace. Logsdon & Williamson, *U.S. Access to Space*, SCI. AM., Mar. 1989, at 34, 35.

116. OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 67. Maintaining a launch system regardless of its cost to the governmental users is also thought to be necessary to achieve technological synergies. Hertzfeld, *supra* note 12, at 206.

users, private launchers can then achieve economies of scale for the commercial sector. For American launchers, government business can be a tremendous boon, since the U.S. government spends a total of \$33 billion per year on space.¹¹⁷ This potential was partly realized by the increase in ELV business during the shuttle launch standdown that followed the Challenger accident.¹¹⁸ Commercial launchers can also achieve economies of scale when the government purchases launch systems for its own use that are similar to those used by commercial launchers since this will reduce the cost of each booster.¹¹⁹ Thus, so long as government does not invade the commercial launch market with its own subsidized launch systems, it can have a positive effect on commercial launchers.

2. COMMERCIAL USERS

Because private launchers cannot expect to capture much of the demand from public sector users, they must rely on the commercial sector for much of their business. Though presently small,¹²⁰ the commercial sector has much potential for future growth.

At present only the communications satellite market is fully mature and profitable.¹²¹ This market was commercialized very early in its development, first with the American Comsat consortium, and later with Comsat's international successor, Intelsat.¹²² Intelsat remains the most important international producer of communications satellites, but its satellites are very large, so that only those companies with the largest launchers are in a position to compete for Intelsat launches.¹²³ American satellite producers currently have a dominant share of the communications satellite market,¹²⁴ and thus provide the strongest customer base for American launchers.

Other markets, though presently less mature, may in the future play a significant role in generating commercial demand, particularly for

117. *The Moon is Made of Gold*, in *The Uses of Heaven*, ECONOMIST, June 15, 1991, Supp. at 6.

118. See, e.g., *supra* note 40 (U.S. Air Force's contracts with Martin-Marietta).

119. CONGRESSIONAL BUDGET OFFICE, *supra* note 68, at 30-31. Similar savings are also expected for Arianespace, however. See *supra* note 78 and accompanying text.

120. Of the 136 satellites launched in 1989, only 16 were commercial. *International Space: Teaming Spurs New Growth* (advertiser sponsored market supplement), AVIATION WK. & SPACE TECH., Mar. 12, 1990, at S1 [hereinafter *International Space*].

121. Hertzfeld, *supra* note 13, at 208.

122. See generally Kwerel & Pitsch, *FCC Regulation of International Telecommunications Satellites and Cables*, in 2 AMERICAN ENTERPRISE, *supra* note 9, at 119, 119-41.

123. *Id.* at 122.

124. American companies produced nearly 70% of all communications satellites from 1980 to 1989, and are expected to continue with a market share of around 60% for 1990 to 1995. *Business as Usual*, in *The Uses of Heaven*, *supra* note 117 at 8.

smaller launch vehicles.¹²⁵ Among these nascent markets are remote sensing satellites,¹²⁶ materials processing,¹²⁷ and "lightsat" communications systems¹²⁸ such as Motorola's proposed Iridium communications network.¹²⁹

D. Outlook for the Future

The commercial space launch industry is at a crucial phase in its development. The U.S. government has finally decided to encourage the development of the industry and to cease its own commercial launches. But commercial launchers are not necessarily any better off with the passing of NASA as a commercial competitor. Arianespace had already eclipsed NASA as the primary threat to commercial ventures by the late 1980's, when the commercial market first started to grow. Arianespace and the three major American launchers are presently fairly evenly matched,¹³⁰ but other countries are entering the market and could easily erode their market shares.

Over the short term, competition for launch services will be quite stiff. Projections of demand for launch services by all users prior to the Challenger accident were, for the most part, overly optimistic.¹³¹ Much of

125. See *International Space*, *supra* note 120, at S10.

126. Though originally a governmental activity, remote sensing has begun commercialization with the privatization of Landsat and the development of the French SPOT system. See generally Henderson, *Private Sector Satellite Remote Sensing: Barriers to Commercialization*, in 2 AMERICAN ENTERPRISE, *supra* note 9, at 79. Other such systems are under development, Uhlir, *The Public International Law of Civilian Remote Sensing: An Overview*, in 2 AMERICAN ENTERPRISE, *supra* note 9, at 25, 65, but it remains to be seen how much additional demand this will create. The real potential for commercialization in remote sensing is in interpretation of data, rather than in the launching of new satellites. *The View from Nowhere*, in *The Uses of Heaven*, *supra* note 117, at 16, 18.

127. Experiments in materials processing can make use of short-term microgravity available from re-entry modules. Corcoran & Beardsley, *supra* note 1, at 85. OSC recently launched its first Prospector rocket, which though a failure was aimed specifically at providing microgravity for small companies and universities. See *Orbital Sciences Team Seeks Cause of Prospector Rocket Launch Failure*, AVIATION WK. & SPACE TECH., June 24, 1991, at 30. Materials processing still involves a great deal of government activity, OFFICE OF TECH. ASSESSMENT, *supra* note 34, at 419, but is becoming accessible at relatively low cost for small scale commercial applications. *Id.* at 340.

128. "Lightsat" systems use a large number of small satellites in low earth orbit, rather than one expensive satellite in geosynchronous orbit. See *International Space*, *supra* note 120, at S1.

129. See Klass, *Motorola's Iridium Satellite System Could Serve Aviation Market*, AVIATION WK. & SPACE TECH., June 3, 1991, at 80, 80-81.

130. Arianespace launched 30 satellites for American customers from 1980 to 1990, as compared to 27 launches for European customers by the three main American launchers. *The Moon is Made of Gold*, *supra* note 117, at 6. Of third market customers Arianespace launched 16 satellites as opposed to 11 launched by the Delta, Atlas and Titan. *Id.*

131. The official government projections for launch demand predicted huge increases in the late 1980's giving way to a steady high demand market in the 1990's. CONGRESSIONAL BUDGET OFFICE, *supra* note 68, at 7. Demand was measured in these projections in "shuttle equivalents" (50,000 pounds to LEO), with most commercial ELVs

this resulted from an overestimation of the performance of the space shuttle. As the program became more expensive, NASA continually downgraded its estimate of demand for shuttle services.¹³² The backlog of launches created by recent failures has helped to keep demand constant over the past few years, but will eventually be cleared.

Over the long term, demand looks to be even softer than over the short term. Although the Challenger accident reduced short-term confidence in space launching, long-term demand should not be affected;¹³³ however, other factors could have an important impact on future demand. Improvements in technology have the potential to increase the life span of satellites¹³⁴ and reduce reliance on space-bound applications.¹³⁵ At present, launchers foresee commercial demand for satellite launches of around 20 to 25 launches in 1990 and 18 to 20 in future years,¹³⁶ though the Hughes Space and Communications Group places that number much lower, at around 10–12 per year.¹³⁷

While demand for large-payload launch services diminishes, the supply of launchers will increase. Commercial providers will have the ability to perform slightly over 20 launches to GTO per year during the 1990's.¹³⁸ The Soviets and the Chinese can probably increase the availability of their launchers, if export controls on their use are relaxed.¹³⁹ Under Hughes' constrained scenario, competition could become fierce, and it is possible that some of the American commercial providers could be forced from the market by governmental providers with deeper pockets.

The future market for small-payload launchers is much harder to predict. The technologies demanding small-payload launch services are

carrying between .25 and .7 shuttle equivalents. *Id.* at 6. From a total U.S. demand of 12 shuttle equivalents in the 1980's projections quickly rose to more than 30 in 1989, and then hovered around 30 throughout the 1990's. Commercial demand was put at between 5 and 9 shuttle equivalents per year through 2000. *Id.* at 7–9.

132. CONGRESSIONAL BUDGET OFFICE, *supra* note 68, at 10–11.

133. This is because government demand, which is not very price responsive, makes up such a large component of overall demand. Hertzfeld, *supra* note 12, at 214.

134. See Dornheim, *supra* note 37, at 76.

135. See Hertzfeld, *supra* note 12, at 209. Alternatives to launching new satellites are being considered even for such obviously space-bound applications as weather satellites. The Commerce Department is considering the use of existing European or Japanese weather satellites rather than launching a new one. Asker, *NOAA and Congress Ponder Backups for Troubled Weather Satellites*, AVIATION WK. & SPACE TECH., June 15, 1991, at 22, 22–23.

136. *International Space*, *supra* note 120, at S4. Arianespace has proffered similar estimates of demand in its "nominal" case of 15–19 launches per year and its "maximum" case of 18–24 per year. *New Launch Contracts*, *supra* note 77, at 191.

137. Dornheim, *supra* note 37, at 73.

138. CONGRESSIONAL BUDGET OFFICE, *supra* note 68, at 24.

139. See *supra* notes 89–103 and accompanying text; *infra* notes 272–314 and accompanying text.

not as well developed.¹⁴⁰ As a result, this segment of the market will be much more price sensitive. Any company that experiences more than one or two launch failures could easily fail.¹⁴¹

The effect of future developments in launch technology is also uncertain. At present ELVs are still the only way for commercial launchers to lift payloads into orbit, and no new technology is likely to supplant ELVs in the near future. However, innovation could lead to the development of alternative technologies, such as gun launchers,¹⁴² which could capture a large portion of the small payload market if a workable system is developed. For large payloads, it is conceivable that the space shuttle or the proposed aerospace plane could become more economical for launches to low earth orbit, but this will happen only if full-scale commercial development is pursued. Other technologies are even further from availability.¹⁴³

Given that the market for launch services is contracting, and that there are no presently viable alternatives to ELVs, competition between the various ELV launchers is certain to become more intense. New competitors are entering the market with below-cost pricing in order to gain market share.¹⁴⁴ Subsidization by foreign governments of their launch companies could easily damage the domestic commercial launch industry and threaten its viability. If the government does not take some action to safeguard the industry, America could lose an industry that is essential for the commercialization of space.

140. See *supra* notes 46–65 and accompanying text. The remote sensing market is already fairly saturated with services available from the United States' Landsat, French SPOT, and Soviet Meteor, and many other countries are developing systems of their own. Uhler, *supra* note 126, at 65. The potential of materials processing is very hard to predict. The time to develop technologies are quite long and many of the improvements developed in space are at least partially effective on Earth, reducing the need for further launches to microgravity. See Hertzfeld, *supra* note 12, at 209–11. In any event, materials processing is unlikely to blossom into a mature technology until the space station is completed, though the commercial use of the Soviet Mir station, see *supra* note 100, could give some corporations a head start. Although transmission from direct broadcasting satellites (DBS) is expected to increase, the actual number of satellites in use is expected to grow relatively slowly. Dornheim, *Mass Market for Satellites to Be Tested over Next Decade*, AVIATION WK. & SPACE TECH., Mar. 19, 1990, at 189.

141. As insurance costs become a greater part of the total cost of launching, low launch prices will not have the same inducement if a launcher is labelled as a bad insurance risk. See *supra* note 62 and accompanying text.

142. Henderson, *Sandia Researchers Test 'Coil Gun' for Use in Orbiting Small Payloads*, AVIATION WK. & SPACE TECH., May 7, 1990, at 88, 88–89.

143. The Air Force is currently developing its Advanced Launch System (ALS) that would carry heavy payloads into LEO for a cost of around \$300 per pound. Logsdon & Williamson, *supra* note 115, at 40. It will in no event be developed before the beginning of the next century. *Id.* The ALS might make it possible to ferry satellites to the space station at very low cost and then launch them to geosynchronous orbit from there. *Id.* If this proves feasible, the market for single payload launchers could evaporate.

144. See *supra* notes 79, 91, 94, and accompanying text.

IV. POSSIBLE GOVERNMENTAL RESPONSES

As competition in the commercial launch industry heats up, the U.S. government will be faced with a choice. Either it can seek to protect the domestic launch industry and ensure its survival, or it can reenter the commercial launch market to guarantee full access to space for American interests. Analysis will show that the latter alternative is unrealistic, and that the United States must take steps to preserve the domestic launch industry. Because the current market situation is competitive, the United States does not need to rush into a decision on regulating trade in launch services, but some international regime will be necessary as demand slackens and more suppliers come into the market. In this area it is important for the government to look at the entire market and arrive at a solution that addresses all the actors. It must consider the roles of governmental and private launchers, both domestic and international. It must also consider the needs of both public and private users, as well as a host of collateral concerns.

A. The Government's Role in Launch Services

Reentry by the government into the commercial launch market might, at first, seem like an attractive alternative to attempting to preserve the viability of private launchers. NASA could return to the launch business, or the government could form a "United States Space Transportation Company" with the government as a major or perhaps majority owner. The shuttle would be used for commercial missions in some cases, but the bulk of U.S. commercial launch business would continue to be carried by ELVs.¹⁴⁵ Space shuttles would have to be operated at higher capacity and additional orbiters might have to be constructed. Either direct NASA competition or a U.S. Space Transportation Company would enjoy the benefits of tremendous size and versatility of services from the availability of both the shuttle and ELVs,¹⁴⁶ as well as the ability to subsidize commercial launches with captive government launches that could be budgeted at higher cost.

There are a number of important drawbacks to such a scenario. First, it is unlikely that new shuttle capacity could be added at costs below the going market rate,¹⁴⁷ so the government would be forced to

145. See CONGRESSIONAL BUDGET OFFICE, *supra* note 68, at 45. The government itself uses the cost advantages of ELVs. Kolcum, *U.S. Maintains Busy Manifest of Manned, Unmanned Launches*, AVIATION WK. & SPACE TECH., Mar. 19, 1990, at 182, 184.

146. CONGRESSIONAL BUDGET OFFICE, *supra* note 68, at 48-49.

147. See *supra* note 6 and accompanying text. However, NASA could efficiently sell excess capacity on governmental shuttle missions since the capacity would otherwise be wasted. Covault, *Spacelab Flight Carries 2.5 Tons of Getaway Payloads*, AVIATION WK. & SPACE TECH., June 24, 1991, at 57. The Columbia recently carried several small payload "Getaway Specials" on its Spacelab mission. *Id.*

subsidize flights on the shuttle. Although this would work to the benefit of shuttle contractors, it would inefficiently take business away from profit-making ELV launchers and give it to a continually loss-generating program. The shuttle has proven to have many unique uses, but it is not the "space truck" it was originally intended to be. The cost of the orbiter and the human component involved in its launches require more preparation and care, which often lead to long delays.¹⁴⁸ But the political necessity of maintaining a manned space program would probably force continued over-reliance on the shuttle in spite of these costs.¹⁴⁹

Regardless of the care involved, all launchers will at some point fail,¹⁵⁰ and the government needs commercial launchers as a backup for its own programs. A failure of an ELV can be an incredible loss—in the hundreds of million dollars—but the loss of a shuttle is catastrophic. Over-reliance on the shuttle also shuts down U.S. launch capabilities following a failure, as in 1986.¹⁵¹ The existence of an alternative launcher would allow the government to continue launching important payloads during a shuttle launch standdown. Although the government could purchase ELVs for such an eventuality, it is possible that Congressional estimates of the number of ELVs needed, or the likelihood of shuttle failure, would prove overly optimistic. With launch services in the private sector, the government can be assured of an alternate launcher unimpeded by bureaucratic optimism. Moreover, shifting the costs of research and development of ELVs to the commercial providers would be more efficient and lead to the use of only those launchers that were economically feasible.¹⁵²

Because of the inefficiency of government launch programs, it is clear that the U.S. government should not reenter the commercial launch industry. With the help of the changes in governmental policies since the Challenger accident, commercialization of launch services is already well underway, a development that should be encouraged. But even if the private sector can provide launch services more efficiently than the

148. See Kolcum, *NASA Due for Organizational Changes to Meet Aerospace Demands of 1990's*, AVIATION WK. & SPACE TECH., Dec. 24, 1990, at 52.

149. *Id.*

150. Even if the space shuttle remains 98% reliable, there is a 72% chance that at least one orbiter will be lost before assembly of the space station begins in 1995, according to the Office of Technology Assessment. Covault, *Panel Calls Shuttle Accident 'Likely' Unless Propulsion Systems Redesigned*, AVIATION WK. & SPACE TECH., Apr. 23, 1990, at 21.

151. The United States lost full access to space for nearly three years following the Challenger accident. Logsdon & Williamson, *supra* note 115, at 34.

152. See generally Cohen & Noll, *Government R&D Programs for Commercializing Space*, 76 AM. ECON. REV. 269 (1986). There are arguments that any commercial R&D by government is inefficient. Since members of Congress are interested in getting reelected, they are often motivated by a desire to see jobs produced in their districts before the next election, rather than by any interest in the long-term goals of the project. *Id.* at 270. Government programs also tend to be slower and more complicated, since they attempt to solve many problems with one program. *The Moon is Made of Gold*, *supra* note 117, at 6-7.

government, some governmental involvement at the regulatory level is needed to prevent hypercompetition and unfair trade practices by foreign launchers. Such efforts will undoubtedly increase costs to launch service users to the extent they successfully remove government subsidization of launching, but such a cost structure will lead to investment in space systems only when truly economical. The government has several options: industrial policy, implemented either through "targeting" the industry for special governmental treatment, or through the use of demand side pressure; cartelization of the market with other launch powers; the use of the current trade regulations; or inclusion of launch services under the proposed GATT services agreement. Not all options are compatible, nor are they mutually exclusive.

B. Industrial Policy

The formulation of a national industrial policy for launch services is one way to help the domestic launch industry compete.¹⁵³ Indeed, advocates of industrial policy portray it as the best alternative to protectionist use of the trade regulations.¹⁵⁴ To implement such a program would require extensive legislation, though not nearly as much as would be required for an industrial policy in other sectors of the economy.

Because of their importance as a threshold to space and their significance to technological development, launch services are the kind of strategic industry that is typically targeted for industrial policy. The commercial launch industry is already a part of the huge American defense establishment, for which the government has at least a de facto industrial policy.¹⁵⁵ As defense cuts begin to reduce the effectiveness of defense policy at helping American industry, the government can simply recast some of the defense programs as industrial competitiveness programs and allow them to continue unabated. Regardless of how these programs are characterized, there are a number of means through which the U.S. government can help the commercial launch industry: direct subsidies, the passthrough of benefits from government funded research, development of infrastructure, demand pressure, and other indirect benefits used to increase profitability.¹⁵⁶ The option of direct subsidies to launchers faced with unfair foreign competition can be immediately

153. See Reynolds & Merges, *supra* note 32, at 27.

154. See, e.g., Reich, *Making Industrial Policy*, 60 FOREIGN AFF. 852 (1982).

155. Whereas industries with primarily commercial applications are generally ignored by the United States government, those related to national security have enjoyed strong support. *Id.* at 864-65.

156. Reynolds & Merges, *supra* note 32, at 27-28.

rejected. Such an approach could be extremely expensive for government and would likely make the launch industry more inefficient.¹⁵⁷

One approach with potential to help commercial launchers is to allow private industry to ride on the coattails of governmental research. The commercial airline industry is one that has benefited greatly from such an organized policy of coordination between military and commercial research programs.¹⁵⁸ Instead of using direct subsidies, the United States cloaked its subsidies by allowing commercial aviation to pass the technology gained from government programs through to commercial development.¹⁵⁹ For example, Boeing was able to save markedly on its development costs by using technology from the government's KC-135 program to develop the 707 aircraft.¹⁶⁰ Indeed for aviation, the American policy of coordination between government and private industry seems to have worked much better than the policies of many other countries in which government directly financed most commercial aircraft development.¹⁶¹ Another example is the development of the commercial satellite industry. NASA contributed mightily to the development of the communications satellite industry by providing the impetus for its development and later allowing Hughes to pass the technology through to its commercial satellites. Hughes is still dominant in the commercial satellite market.¹⁶² A similar effort by NASA or another government agency could greatly benefit the commercial launch industry.¹⁶³

Helping to build the infrastructure needed by industry is another form of industrial policy.¹⁶⁴ The commercial launch industry, however, can obtain only limited benefit from such a policy because the infrastructure for space services is already well established. The United States has two fully-developed launch sites,¹⁶⁵ which should be adequate

157. Reynolds, *Space Law in the 1990's: An Agenda for Research*, 31 JURIMETRICS J. 1, 8 (1990).

158. R. NELSON, HIGH-TECHNOLOGY POLICIES: A FIVE NATION COMPARISON 52 (1984).

159. *See id.* at 51.

160. Mowery & Rosenberg, *The Commercial Aircraft Industry*, in GOVERNMENT & TECHNICAL PROGRESS: A CROSS-INDUSTRY ANALYSIS 101, 131 (R. Nelson ed. 1982). Through this program, Boeing was transformed from an extremely minor player in commercial aviation before 1958 into the dominant international producer of commercial jet aircraft today. *Id.* at 111.

161. *See* R. NELSON, *supra* note 158, at 51-57.

162. Reynolds & Merges, *supra* note 32, at 35-36 n.92.

163. The Air Force's Advanced Launch System, *see supra* note 143, could fill this role quite nicely.

164. Such a policy has benefitted both the railroads, through the granting of rights of way, Reynolds & Merges, *supra* note 32, at 30, and the housing and automobile industries through the construction of the interstate highway system, Reich, *supra* note 154, at 880.

165. These are the Kennedy Space Center in Florida and Vandenberg Air Force Base in California. W. VON BRAUN, F. ORDWAY & D. DOOLING, *SPACE TRAVEL: A HISTORY* 242, 244 (4th ed. 1985).

given the expected flat or declining demand for launch services.¹⁶⁶ The government, thus, has little to do except assure that the environment for infrastructure improvement is good, and that commercial launchers have reasonable access to the available government facilities.¹⁶⁷ The government probably does not need to do much more to establish better public launch infrastructure,¹⁶⁸ as this would be a poor allocation of scarce resources.¹⁶⁹ Subsidies for the construction of private launch facilities are unnecessary because the Commercial Space Launch Act provides private launchers with access to government launch sites.¹⁷⁰ The combination of the expense of building new launch sites and the need for government oversight required by both the Liability Treaty¹⁷¹ and the Commercial Space Launch Act¹⁷² militates against the operation of a private spaceport.

Government demand-side pressure can also be very effective, as it was in the case of airline development. The Kelly Air Mail Act of 1925, for example, privatized air mail carriage and reduced airmail rates while keeping payments to air carriers constant, a subsidy that greatly increased the volume of mail travelling by air.¹⁷³ The government could easily initiate a similar policy with NASA and Defense Department demand.¹⁷⁴ In the area of demand-side pressure, the United States enjoys a huge advantage over other countries because public sector demand for

166. See *supra* notes 131–37 and accompanying text.

167. The government has already taken action to standardize the availability of government launch sites with the Air Force's *Model Expendable Launch Vehicle Commercialization Agreement* (2d rev., May 12, 1989). See *supra* notes 26–27 and accompanying text. The most recent amendments to the Commercial Space Launch Act direct the Secretary of Transportation to encourage public-private partnerships in improving and expanding the space launch infrastructure. Pub. L. No. 101-611 § 117(e)(3), 104 Stat. 3188, 3203 (1990), 49 U.S.C.A. § 2604(a)(3) (West Supp. 1991).

168. See Hertzfeld, *supra* note 12, at 206.

169. Building new launch sites could easily run into the billions of dollars. *Hearings, supra* note 27, at 317. Cf. Kolcum, *Titan Launch Complexes Being Rebuilt to Meet Target Date for Mars Observer*, AVIATION WK. & SPACE TECH., Feb. 4, 1991, at 53 (renovation of a launch complex is a \$300 million project).

170. See *supra* note 26 and accompanying text.

171. Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. 7762.

172. 49 U.S.C. § 2613 (1988).

173. Mowery & Rosenberg, *supra* note 160, at 140–41. The McNary-Watres Act of 1930 helped airlines to purchase faster planes by rewarding carriers that used radios, multi-engine aircraft and other innovations. *Id.*

174. Space systems is one area of the military budget that has heretofore escaped major budget cuts, and the military is preparing to launch its next generation of surveillance satellites during the 1990's. Smith, *U.S. Military to Increase Reliance on Space Systems in Coming Decade*, AVIATION WK. & SPACE TECH., Mar. 19, 1990, at 187, 187–188. Since the Air Force is presently using only the Titan IV, however, the benefits of increased defense satellite usage might accrue only to Martin-Marietta. See *supra* notes 39–40 and accompanying text.

launch services is so large.¹⁷⁵ President Bush has already announced that launch of U.S. government satellites will be restricted to domestically manufactured vehicles unless specifically exempted by the President.¹⁷⁶ Given that the U.S. government accounts for 90% of U.S. demand and 40% of world demand for space products,¹⁷⁷ such a preference could be of great aid to the domestic launch industry. Demand-side pressure, though not an effective way to build infrastructure, is a relatively inexpensive way to increase the profitability of domestic launchers.

Profitability can also be increased by providing tax breaks or loans,¹⁷⁸ or by easing restrictions on industry.¹⁷⁹ One of the simplest means of easing restrictions on industry is by limiting liability. This approach has been used to encourage industry since the informal application of favorable tort treatment for railroads in the nineteenth century.¹⁸⁰ Later manifestations have been statutory, such as the Warsaw Convention,¹⁸¹ and Section 4 of the Price-Anderson Act of 1957.¹⁸² Section 16 of the Commercial Space Launch Act¹⁸³ is a good start at limiting the liability of commercial launchers, and should substantially ease the burdens on the industry. Antitrust exemption can also be beneficial,¹⁸⁴ as it was in the merger that produced McDonnell-Douglas in 1967.¹⁸⁵

Despite its general aversion to governmental support of industry,¹⁸⁶ the Bush Administration has recently made some proposals to benefit

175. See *supra* note 117 and accompanying text. A similar advantage allowed government demand to drive the American aircraft industry but not that of the Japanese. R. NELSON, *supra* note 158, at 57.

176. *Bush Issues Policy Directing Agencies to Focus on Commercial Space Industry*, 7 Int'l Trade Rep. (BNA) 1371 (Sept. 12, 1990) [hereinafter *Bush Issues Policy*].

177. Asker, *Demand for Space Products, Services Grows at Healthy Rate*, AVIATION WK. & SPACE TECH., May 28, 1990, at 51.

178. See Dula, *supra* note 11, at 186. For a discussion of the effects of the investment incentives of the Economic Recovery Act of 1981, see Thorning, *Investment Incentives: Do They Work?*, 31 TAX NOTES 515 (1986).

179. Efforts to increase profitability are generally framed as the removal of restrictions from the targeted industry, but these efforts do not necessarily lead to the savings being channeled into the improvement of profitability. Reich, *supra* note 154, at 857-59.

180. Reynolds & Merges, *supra* note 32, at 30-31.

181. Convention Relating to International Transportation by Air. October 12, 1929, 49 Stat. 3000, T.S. No. 876, 2 Bevans 983, 137 L.N.T.S. 11, *reprinted in* 49 U.S.C. § 1502 (1988) (international aviation).

182. 42 U.S.C. § 2210 (1988) (nuclear power accidents).

183. 49 U.S.C. § 2615 (1988). See *supra* note 22 and accompanying text.

184. For a discussion of the ability of antitrust exemptions to encourage innovation, see Jorde & Teece, *Innovation, Cooperation and Antitrust*, 4 HIGH TECH. L.J. 1 (1989).

185. Mowery & Rosenberg, *supra* note 160, at 113.

186. The Bush Administration recently sacked Craig Fields, the director of the Defense Advanced Research Projects Agency (DARPA), allegedly because he took an overly interventionist position on industrial policy and the role of government in United States technological development. His position reportedly ran afoul of the free market instincts

commercial space ventures. President Bush and congressional leaders have discussed such programs as federal "space bonds" and voluntary income tax checkoffs,¹⁸⁷ and the President has directed governmental agencies to "actively consider commercial space launch needs and factor them into their decisions."¹⁸⁸ State governments have also begun to coordinate space policy. Florida has organized the Aerospace States Association to coordinate state governmental efforts to support space technology.¹⁸⁹

C. Cartelization

An alternative to domestic intervention into the commercial launch industry would be some form of international market cartelization. Such systems have been used in the past, notable examples being the United Nations Council on Trade and Development (UNCTAD) Convention on a Code of Conduct for Liner Conferences,¹⁹⁰ and airline capacity control agreements.¹⁹¹ Indeed, the European Space Agency has expressed some interest in regulating prices,¹⁹² and at least one proposal for controlling launch capacity has been made.¹⁹³

The argument for capacity controls is that because so many launch providers are governments motivated by non-economic factors, some form of capacity controls is necessary to prevent a price war and "ruinous competition."¹⁹⁴ But capacity controls based on the airline and shipping

of Budget Director Richard Darman and Chief Economic Adviser Michael Boskin. *Beheaded*, *ECONOMIST*, Apr. 28, 1990, at 27.

187. Asker, *Bush Lobbies Congressional Leaders for Support of U.S. Civil Space Efforts*, *AVIATION WK. & SPACE TECH.*, May 7, 1990, at 31.

188. *Bush Issues Policy*, *supra* note 176, at 1371. Others have called for a cabinet level Department of Air and Space. See Engen, *New Air and Space Dept. Would Speed Progress Toward Meeting 21st Century Goals*, *AVIATION WK. & SPACE TECH.*, Dec. 10, 1990, at 78, 78-79.

189. *Florida Leads Effort to Organize States with Stakes in Commercial Space*, *AVIATION WK. & SPACE TECH.*, Sept. 17, 1990, at 41. In addition to Florida, representatives from the state governments of Alabama, California, Colorado, Hawaii and Virginia attended the Association's first meeting on July 31, 1990. *Id.* Other states, particularly Ohio, Texas, and Utah, have been invited to participate in future meetings. *Id.*

190. U.N. Reg. No. 22380, *reprinted in* 13 *INT'L LEGAL MAT.* 910-948 (1974) [hereinafter UNCTAD Code of Conduct]. As of December 1988, seventy-seven countries had signed, acceded to, or in some way approved of the Code of Conduct. These included the Soviet Union, the United Kingdom, Germany, India, and Brazil, but not the United States or Japan. UNITED NATIONS, *MULTILATERAL TREATIES DEPOSITED WITH THE SECRETARY GENERAL* (Status as of December 1988) (1989).

191. The International Air Transport Association (IATA) was set up as an "operators" conference similar to UNCTAD liner conferences. P. HAANAPPEL, *PRICING AND CAPACITY DETERMINATION IN INTERNATIONAL AIR TRANSPORT: A LEGAL ANALYSIS* 13-14, 18 (1984).

192. Raclin, *supra* note 79, at 52 n.83.

193. Jiefang, *Toward a Regulatory Regime for Competition in Space Transport*, in *SPACE LAW: VIEWS OF THE FUTURE* 57 (T. Zwaan ed. 1988).

194. *Id.*

models would be inappropriate because of important differences between those industries and the launch industry.¹⁹⁵ The most obvious difference is that launch providers, although suffering from high fixed costs, do not suffer from a problem of excess capacity. Because payloads are relatively small—one or two satellites at the most—filling a flight is much easier than filling a cargo ship or a commercial aircraft on scheduled service. Therefore, it is almost certain that every launch will be made at full cargo capacity. Even if the situations were more closely analogous, it is unclear how well capacity controls have worked in either the shipping industry or in aviation. The UNCTAD Code of Conduct has been criticized as “balkanizing” world trade in shipping by mandating national preferences,¹⁹⁶ and the wave of airline deregulation that shook the United States after 1978¹⁹⁷ appears to be imminent internationally.¹⁹⁸

Analogies to primary product cartels, such as OPEC,¹⁹⁹ are also difficult. Although the service of launching is fungible, it is not a homogenous commodity like oil. The quality of service and its reliability can vary greatly. Under a system of capacity controls, certain commercial launch customers would therefore be relegated to inferior launch providers because the more reliable providers were fully booked. Governments would have to develop a system for yearly allocation of available satellites. A flat allocation based on current capabilities would be unable to respond to changing conditions, while a formula or ad hoc allocation could be exceedingly complex and politically charged. The cartel would have to make provisions for new members and for reallocating capacity within the cartel if a new launch power refused to join. Also, division of capacity between U.S. launchers would raise considerable antitrust concerns.²⁰⁰

195. Once launchers begin carrying cargo and passengers to particular points in space, rather than simply into orbit, the analogy might be closer. Countries might want to impose capacity controls on service to their space stations and lunar bases to assure full utilization of capacity. *Id.* at 60–62. Even this scenario is a long way off, however, since it assumes low marginal costs and excess cargo capacity. At least with regard to lunar bases, capacity controls might be in violation of the Outer Space Treaty. Multilateral Treaty on the Exploration and Use of Outer Space, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. 6347, 610 U.N.T.S. 205. Article XII requires that “all stations . . . on the moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity.” *Id.* at 2418. Since the Treaty is widely accepted, this could prove a major barrier to capacity controls on lunar service.

196. The Code of Conduct could virtually eliminate international competition with its national preferences. See Kanuk, *The UNCTAD Code of Conduct for Liner Conferences: Trade Milestone or Millstone—Time Will Soon Tell*, 6 Nw. J. INT'L L. & BUS. 357, 358 (1984).

197. P. HAANAPPEL, *supra* note 191, at 50–56.

198. *Id.* at 57–60.

199. For a discussion of the structure and operation of OPEC, see Comment, *OPEC as a Legal Entity*, 3 FORDHAM INT'L L. FORUM 91 (1979–80).

200. In order to implement airline capacity controls, the Civil Aeronautics Board waived applicability of the antitrust laws. P. HAANAPPEL, *supra* note 191, at 83. The launch industry would require similar intervention.

Economically, cartels are difficult to sustain. Cartels can only exist if there are no good substitutes for the product, reasonable size of membership is maintained, administrative costs are low, and there is a low risk of defection and new entry.²⁰¹ There are certainly high barriers to entry into the launch industry, since governments can control who uses space, but membership in the cartel would have to include all the present and potential space powers to prevent cheating. It is also unclear whether demand for launch services is sufficiently inelastic to prevent the substitution of satellite alternatives, such as undersea cable. The administrative costs of cartels can be quite high, and the protected market can lead members to become less efficient.²⁰² This could be particularly problematic for launch services, since some members of the cartel would be governments, which are motivated by a host of political and other non-economic factors that could further hinder attempts at efficiency. If a cartel is only partially successful, the result can be the hypercompetitive market it was formed to prevent.²⁰³

D. Use of Existing Trade Regulations

Rather than intervene directly into the commercial launch market through either industrial policy or cartelization, the government could take the approach of using regulations—either national, international or both—to aid the commercial launch industry. The unilateral use of existing U.S. trade regulations would require the least legislative change and could probably be carried out entirely by the Administration. But the unilateral nature of the use of the U.S. trade laws could increase tension between the United States and other launch providers. Trade regulations that could be brought to bear on launch services include countervailing duty and anti-dumping laws, powers granted to the United States Trade Representative (USTR), and export controls.

1. COUNTERVAILING DUTIES AND ANTIDUMPING MEASURES

Although countervailing duties and antidumping measures are a primary way to combat unfair trade practices, both are aimed at the importation of goods into the United States. Countervailing duties are

201. McGee, *Ocean Freight Rate Conferences and the American Merchant Marine*, 27 U. CHI. L. REV. 191, 197 (1960).

202. *Id.* at 199, 201.

203. If the cartel experiences enough success to maintain monopoly profits long enough for other parties to realize their value, there will be new entrants into the market. These new competitors will eventually cause the collapse of the cartel, and there will be even more competitors, with even more excess capacity, than before the cartel was formed. *Id.* at 202.

authorized by Section 303 of the Tariff Act of 1930.²⁰⁴ If the U.S. International Trade Commission (ITC) finds that "any country . . . shall pay or bestow, directly or indirectly, any bounty or grant upon the manufacture or production or export, of any article or merchandise manufactured or produced in such country,"²⁰⁵ it is to apply a countervailing duty equal to the "net amount of such bounty or grant."²⁰⁶ However, imports produced in countries party to the General Agreement on Tariffs and Trade (GATT) Subsidies Code²⁰⁷ are covered by Section 701(a) of the Act²⁰⁸ rather than by Section 303.²⁰⁹ Section 701 adds an injury requirement²¹⁰ to the basic rule of Section 303, and uses the term "subsidy" rather than "bounty or grant."²¹¹ Subsidies are countervailable if they are aimed primarily at the export market,²¹² or if they are "domestic" subsidies that provide a specific benefit to the producer.²¹³ Although the statute provides no specific rules for determining the amount of a subsidy,²¹⁴ the general rule is that the subsidy is equal to the cost advantage of the government-provided services over obtaining them on the open market.²¹⁵ Countervailing duty investigations may be instigated by the ITC²¹⁶ or by private petition.²¹⁷

Antidumping law is also aimed at unfairly priced imports. Section 731 of the Tariff Act²¹⁸ provides relief against goods priced at "less than fair value,"²¹⁹ so it applies more to individual producers than do countervailing duties. Antidumping investigations may be initiated by the International Trade Administration (ITA)²²⁰ or by private petition

204. 19 U.S.C. § 1303 (1988).

205. *Id.* § 1303(a)(1) (1988).

206. *Id.*

207. Agreement on Interpretation and Application of Articles VI, XVI, and XXIII of the General Agreement on Tariffs and Trade, *opened for signature* June 30, 1979, GATT Basic Instruments and Selected Documents 58-83 (26th Supp. 1980) [hereinafter Subsidies Code].

208. 19 U.S.C. § 1671 (1988).

209. *Id.* § 1303(a)(1).

210. *Id.* § 1671(a)(2).

211. *Id.* § 1671(a)(1). "Subsidy" is defined by 19 U.S.C. § 1677(5), and is intended to have the same meaning as "bounty or grant."

212. *Id.* § 1677(5)(A)(i). These subsidies are listed in an annex to the Subsidies Code, *supra* note 207, Annex(a), at 80, but can be difficult to classify in practice. Sykes, *Countervailing Duty Law: An Economic Perspective*, 89 COLUM. L. REV 199, 203 (1989).

213. 19 U.S.C. § 1677(5)(A)(ii) (1988). Specific benefits are those provided to the producer alone rather than to the general public. Sykes, *supra* note 212, at 204.

214. *Ipsco, Inc. v. United States*, 899 F.2d 1192, 1195-96 (Fed. Cir. 1990). The court found that the ITC is often inconsistent in figuring the amounts of subsidies. *Id.* at 1197.

215. *See* Sykes, *supra* note 212, at 205.

216. 19 U.S.C. § 1671a(a) (1988).

217. *Id.* § 1671a(b).

218. *Id.* § 1673.

219. *Id.* § 1673(1).

220. *Id.* § 1673a(a).

through the ITC.²²¹ As do the countervailing duty laws, Section 731 has a material injury requirement,²²² and lists numerous factors to be considered in the determination of injury.²²³ Section 731 also applies only to "merchandise."²²⁴ The limitation to "merchandise" is consistent with GATT coverage of antidumping, which allows antidumping measures only against dumped "products."²²⁵ Services traditionally have not been covered by international and domestic antidumping regulations.²²⁶ In addition to the trade laws, those injured by dumping may rely on Section 801 of the Antidumping Act of 1916,²²⁷ which is part of the antitrust laws and provides for both criminal penalties and private suits.²²⁸ The coverage of the 1916 Act is also limited to "articles" imported into the United States.²²⁹

At present, services do not fall within the technical coverage of domestic countervailing duty²³⁰ and antidumping laws.²³¹ However, efforts are being made at both national and international levels to bring services within the coverage of antidumping regulations.²³² The developing GATT services agreement could provide some protection against dumping of services,²³³ although the United States professes to

221. *Id.* § 1673a(b).

222. *Id.* § 1673(2).

223. *Id.* § 1677(7)(B), (C). One factor that could be important for the commercial launch industry is the potential injury to the industry's ability to develop derivative technology, *id.* § 1677(7)(C)(iii)(IV), since many of the country's future space plans depend on development of technology by existing NASA contractors.

224. *Id.* § 1673.

225. General Agreement on Tariffs and Trade, Oct. 30, 1947, art. VI, 61 Stat. 5, 11, 58, T.I.A.S. No. 1700, 55 U.N.T.S. 187, 258.

226. Zerby, Ellsworth & Schmitt, *Dumping of Non-Factor Services: Some Implications of Recent Experiences with Controlled-Economy Shipping*, 4 *Nw. J. INT'L L. & BUS.* 37, 38-39 (1982).

227. 15 U.S.C. § 72 (1988).

228. *Id.* The 1916 Act also allows the President to prohibit the import of the offending item. 15 U.S.C. § 75 (1988). For a discussion of the Antidumping Act of 1916, see Sidak, *A Framework for Administering the 1916 Antidumping Act: Lessons from Antitrust Economics*, 18 *STAN. J. INT'L L.* 337 (1982).

229. 15 U.S.C. § 72 (1988).

230. Currently countervailing duties may be imposed only on "any article or merchandise." 19 U.S.C. § 1303(a)(1) (1988). See *supra* note 205 and accompanying text.

231. 19 U.S.C. § 1673 (1988). See *supra* note 224 and accompanying text.

232. The European Community's GATT services proposal addresses the issue of dumping of services. Hindley, *Services*, in *COMPLETING THE URUGUAY ROUND: A RESULTS-ORIENTED APPROACH TO THE GATT TRADE NEGOTIATIONS* 130, 136 n.3. (J. Schott ed. 1990). One sector of services in which dumping has already been examined is that of shipping. Zerby, Ellsworth & Schmitt, *supra* note 226, at 51-56. More recently, there have been allegations of dumping by foreign providers on the U.S. market. *U.S. Supports Cross Retaliation Concept in GATT Services Talks, USTR Official Says*, 7 *Int'l Trade Rep.* (BNA) 1111, 1111 (July 18, 1990) [hereinafter *U.S. Supports Cross Retaliation*].

233. *U.S. Supports Cross Retaliation, supra* note 232, at 1111-12.

prefer modification of domestic antidumping law as the best way to expand coverage to include services.²³⁴

Although technical changes could with some difficulty bring services under the coverage of the countervailing duty and antidumping laws,²³⁵ there are serious doctrinal obstacles to doing so. Because foreign launch services are provided outside the United States, beyond the traditional jurisdiction of the United States, application of U.S. trade laws would require use of effects jurisdiction. The United States supports this doctrine for the purpose of enforcing its antitrust laws,²³⁶ but other countries have strongly criticized this approach.²³⁷ Even in the area of antitrust,²³⁸ the effects doctrine has been limited to acts that affect imports into the United States, or to acts involving export trade or commerce that affects U.S. exporters.²³⁹ Application to launch services would therefore

234. *Id.* However, Deputy Assistant Secretary of Commerce for Services Linda Powers told the House Task Force on the International Competitiveness of U.S. Financial Institutions that although the United States is concerned with services dumping and is considering modifying domestic antidumping law, it must do so cautiously since the U.S. could stand to lose a great deal from foreign retaliatory measures against U.S. services. *Id.*

235. Adding the word "services" to the definitions in 19 U.S.C. §§ 1303(a)(1), 1671(a)(1), & 1673, and 15 U.S.C. § 72, and corresponding modifications to include "service providers" would not be enough. Because services can be "exported" by the service provider going to the customer or by the customer coming to the service provider, the definition of "export" would be crucial.

236. The effects doctrine was first enunciated in the field of antitrust law by Judge Learned Hand in *United States v. Aluminum Co. of Am.*, 148 F.2d 416 (1945). The Supreme Court has since indicated its approval of the effects doctrine. *Continental Ore Co. v. Union Carbide & Carbon Corp.*, 370 U.S. 690, 704 (1962) ("[a] conspiracy to monopolize or restrain the domestic or foreign commerce of the United States is not outside the reach of the Sherman Act just because part of the conduct complained of occurs in foreign countries" (citations omitted)). It has since been codified as Section 7 of the Sherman Act by the Foreign Trade Antitrust Improvements Act of 1982, Pub. L. 97-290, Title IV § 402, 96 Stat. 1246 (codified as amended at 15 U.S.C. § 6a (1988)). Standards governing when to apply the effects doctrine were set out in *Timberlane Lumber Co. v. Bank of Am.*, 749 F.2d 1378 (9th Cir. 1984), *cert. denied*, 472 U.S. 1032 (1985).

237. The European Court of Justice declined to rely on the effects doctrine in striking down North American and Scandinavian pulpwood cartels under European Community competition laws. *A. Ahlström Osakeyhtiö v. Comm'n*, Case 89/85, 1988 Common Mkt. Rep. (CCH) ¶ 14,491 at 18,612 (1988). This was despite strong argument by the Advocate General that the effects doctrine be adopted. *Id.* at 18,623. At the national level, the United Kingdom has gone so far as to prohibit its courts from assisting in the adjudication of any case or the enforcement of any judgment that infringes on its sovereignty. *Protection of Trading Interests Act*, 1982, ch. 11, §§ 4-6, *reprinted in* 21 INT'L LEGAL MAT. 834 (1982). For an exchange of diplomatic notes between the United States and the United Kingdom on the subject of antitrust jurisdiction, *see* 21 INT'L LEGAL MAT. 840-50 (1980). For a discussion of other countries' blocking laws in response to the effects doctrine, *see* Cira, *The Challenge of Foreign Laws to Block American Antitrust Actions*, 18 STAN. J. INT'L L. 247, 248-60 (1982).

238. The development of antitrust and antidumping law shares some parallels. Zerby, *Ellsworth & Schmitt*, *supra* note 226, at 42-43.

239. 15 U.S.C. § 6a (1988).

require a significant extension of the effects doctrine since it is unclear whether launch services providers would be considered exporters.²⁴⁰

The doctrine of foreign sovereign immunity and the act of state doctrine are of much less concern. Each of these doctrines contains an exception for commercial activity undertaken by the foreign government.²⁴¹ Any commercial launching by launchers owned by foreign governments is clearly commercial activity if sold on the international market to public and private users of many nationalities.²⁴²

Application of countervailing duty and antidumping law to services is complicated by the difficulty of enforcement. In the commercial launch market, as with other service markets, it is the customer or the factors of production that moves across national borders,²⁴³ so the service never actually "enters" the United States.²⁴⁴ One way to circumvent this problem would be to apply a special tax to the export of satellites from the United States for foreign launch.²⁴⁵ Where there is elasticity of import supply, countervailing duties will tend to injure domestic consumers because it is they who will pay the duty entirely out of their consumer surplus.²⁴⁶ For less elastic markets the amount of the duty paid by

240. There is very little case law on this subject. See *McGlinchy v. Shell Chemical Co.*, 845 F.2d 802, 814-15 (9th Cir. 1988) (sales agents who provided services for chemical company in Southeast Asia were not "exporters" for purposes of § 6a(1)(B)). But see *In re Insurance Antitrust Litigation*, 723 F. Supp. 464, 486 (N.D. Cal. 1989) (applying effects doctrine to find that foreign reinsurers were importers of reinsurance services for purposes of § 6a(1)(A)), *rev'd on other grounds*, 938 F.2d 919 (9th Cir. 1991). No cases have addressed whether U.S. service providers that provide services within the United States are exporters under section 6a(1)(B).

241. Section 1605(a)(2) of the Foreign Sovereign Immunities Act states that no foreign state will be immune from U.S. jurisdiction in an action based on commercial activity. 28 U.S.C. § 1605(a)(2). Commercial activity is defined by type, rather than by purpose. *Id.* § 1603(d). Activities typically carried out for profit are usually considered commercial if performed by a government. Comment, *Two Faces of the Trader: Guidelines for Distinguishing Between Governmental and Commercial Acts Under the Foreign Sovereign Immunities Act of 1976*, 23 TEX. INT'L L.J. 465, 469-70 (1988).

There is strong evidence for a commercial exception to the act of state doctrine. A plurality of the Supreme Court has suggested that the act of state doctrine should not be extended to commercial activities in light of the current restrictive approach to sovereign immunity. *Alfred Dunhill of London, Inc. v. Republic of Cuba*, 425 U.S. 682, 695 (1976). See also *Northrop Corp. v. McDonnell Douglas Corp.*, 705 F.2d 1030, 1048 n.25 (9th Cir. 1983); *Hunt v. Mobil Oil Corp.*, 550 F.2d 68, 73 (2d Cir. 1977); Leigh & Sabbatino, *Silver Anniversary and the Restatement: No Cause for Celebration*, 24 INT'L L. 1, 12-14 (1990).

242. Launches by a governmental launcher for its own government would not always be commercial activity, since the profit motive will not usually be present. This Comment does not take the position that governments should be regulated when providing launch services for themselves.

243. Hindley, *supra* note 232, at 130-131.

244. Zerby, Ellsworth & Schmitt, *supra* note 226, at 38 n.8.

245. Comment, *supra* note 6, at 146. In this regard launch services are different from most services, for which the only possible trade regulation is through the use of non-tariff barriers. Hindley, *supra* note 232, at 133.

246. Sykes, *supra* note 212, at 220.

consumers and by foreign producers will vary.²⁴⁷ Economists view countervailing and antidumping duties as a "second best" alternative to be used only if the economic and political costs of displacement of workers and reallocation of resources are too high.²⁴⁸ This is not the case in the commercial launch industry since the satellite makers provide a powerful political counterweight to domestic launchers.

Given the practical difficulties in implementing antidumping measures and countervailing duties, along with their questionable economic effects, the Administration should be very careful in implementing them in the area of services. Furthermore, the radical change in policy that would be required to implement the trade laws extraterritorially could cause an enormous international protest.²⁴⁹

2. RELIEF FROM UNFAIR TRADE PRACTICES

Two alternatives to countervailing duty and antidumping laws are Section 301 of the Trade Act of 1974,²⁵⁰ and Section 337 of the Tariff Act of 1930,²⁵¹ each of which can be used to combat unfair trade practices. Section 301 is designed to give the USTR sweeping powers to combat unfair trade practices by foreign governments and specifically provides remedies for unfair trade in services.²⁵² It is not limited to imports, but applies to any unjustifiable injury to U.S. commerce.²⁵³ Section 301's definition of what constitutes unfair trade practices is very broad. It provides generally that the USTR may impose sanctions against countries that have denied U.S. rights under any trade agreement,²⁵⁴ or have unfairly restricted U.S. trade.²⁵⁵ This combination of objective and subjective factors gives the USTR great latitude in finding violations. Especially powerful are the "Super 301" provisions, which provide the USTR with a laundry list of violations including barriers to entry, inadequate intellectual property protection, excessive government tolerance of antitrust violations, export targeting, and unfair labor practices,²⁵⁶ as well as closed service sectors.²⁵⁷

247. *See id.* In these cases, which are more common than perfect elasticity, the benefits to the economy as a whole, and to domestic consumers, are very hard to quantify. *Id.* The ability of a firm receiving a subsidy to shift the effect of a countervailing duty will depend on the market power of that seller and on the monopsony power of the imposing country's consumers. *See id.* at 223.

248. *See id.* at 236.

249. *See supra* note 234.

250. 19 U.S.C. § 2411 (1988).

251. *Id.* § 1337.

252. *Id.* § 2411(c)(1)(B).

253. *Id.* § 2411(a)(1)(B)(ii).

254. *Id.* § 2411(a)(1)(A).

255. *Id.* § 2411(a)(1)(B)(ii).

256. *Id.* § 2411(d)(3)(B).

257. *Id.* § 2411(c)(1)(B).

The remedies available to the USTR are also broad.²⁵⁸ Section 302 allows private parties to petition the USTR,²⁵⁹ or the USTR may initiate an action herself.²⁶⁰ Because of the potential for international controversy in a Section 301 investigation, the government might want to wait for a private petition before pursuing an investigation of unfair trade practices in the launch services market. Reliance on private party petitions would leave assessment of the various market factors to the petitioner and would serve to keep the government relatively neutral in the investigation. An appearance of neutrality will be especially important for countries with which the United States is trying to negotiate trade agreements. It is highly probable that the importance of launch services to national security and technological development would cause offending countries to refuse to make any concessions.

Private parties in the launch services industry have already attempted to petition for redress under Section 301. In 1984, Transpace Carriers, Inc., one of the several small companies trying to get a foothold in the launch industry, filed a petition pursuant to Section 301 with the Commerce Department.²⁶¹ Transpace alleged that the European firm Arianespace was engaged in two-tiered pricing and asked for relief.²⁶² President Reagan rejected the petition, however, because at the time NASA was also providing launch services at below cost.²⁶³ Since the time of the Transpace petition, efforts of the USTR in applying "Super 301" measures in the space services industry have met with some success in regard to Japan, which has tentatively agreed to make its government procurement of satellites more open to foreign businesses.²⁶⁴ The sole

258. Section 301(b) allows the USTR to withdraw trade concessions, impose new restrictions, and obtain new agreements from offending countries. *Id.* § 2411(c)(1)(A)-(C).

259. The USTR must determine whether to act on a private petition within 45 days. *Id.* § 2412(a)(2). If she decides not to act, she must "inform the petitioner of the reasons therefor." *Id.* § 2412(a)(3).

260. *Id.* § 2412(b).

261. Raclin, *supra* note 79, at 50-52.

262. Determination Under Section 301 of the Trade Act of 1974 (memorandum for the United States Trade Representative), 50 Fed. Reg. 29631-32 (1985).

263. The President stated that many of Arianespace's alleged violations were also practiced by the United States. Since up to this time only governments had been involved in providing launch services, the President reasoned that the trade laws should not be used to judge the validity of government programs to encourage the use of space. He went on to say that there was little difference between the American and European markets for launch services. For the most part, both were captive markets of the government launcher, since the overall majority of demand for launch services was governmental. The only difference was that in the United States there was a growing private buyers' market. Furthermore, given the lack of a private sellers' market, there was no harm in governments offering discounts to establish themselves in the commercial market, since this was an economically acceptable practice. *Id.*

264. *U.S., Japan Reach Tentative Pact to Open Japan's Public Sector Satellite Markets*, 7 Int'l Trade Rep. (BNA) 460 (Apr. 4, 1990).

private party petition in the area of launch services filed since the Transpace petition is currently inactive.²⁶⁵

Section 337 of the Tariff Act of 1930²⁶⁶ also provides relief against unfair trade practices in broad terms similar to those of Section 301. It directs the ITC in response to private petition²⁶⁷ to conduct investigations of unfair trade practices other than those requiring antidumping penalties or countervailing duties,²⁶⁸ and to exclude the importation of offending articles.²⁶⁹ Section 337 applies only to "articles,"²⁷⁰ and also imposes an injury requirement.²⁷¹ Because of these limitations, it is of little use to the commercial launch industry.

3. EXPORT CONTROLS

Export controls do not directly address the launch industry,²⁷² as none of the rockets or launch services is actually exported from the United States. Rather, export controls affect the export of satellites for launch elsewhere, and can therefore be used to keep satellites within the United States, where the satellite owners would have no choice but to use domestic launchers. Because the United States is the dominant producer of satellites,²⁷³ this approach could be very effective. Indeed, Congress has already attempted to use export controls to protect the domestic launch industry.²⁷⁴

The export of most satellites is covered by the Arms Export Control Act (AECA)²⁷⁵ and the accompanying International Traffic in Arms

265. The petition of the National Space Society was lodged in protest of Chinese violations of the 1989 space launch agreement between the United States and China. *President Authorizes U.S. Participation*, *supra* note 110, at 1326–27. See also *supra* note 94 and accompanying text.

266. 19 U.S.C. § 1337 (1988).

267. *Id.* § 1337(b)(1).

268. *Id.* § 1337(b)(3).

269. *Id.* § 1337(d).

270. *Id.* § 1337(a)(1).

271. *Id.* § 1337(a)(1)(A).

272. Although the federal government requires domestic launchers to obtain a launch license for domestic launches licensed under the Commercial Space Launch Act, 49 U.S.C. § 2605 (1988), export licenses are no longer required. *Id.* § 2620 (1988). The Department of Transportation is to issue terms for review of launch license applications, 14 C.F.R. §§ 400–415 (1990), but is free to allow national security concerns to be used as a justification for a denial of a launch license. *Id.* § 411.7(a) (1990).

273. See *supra* note 124 and accompanying text.

274. Pub. L. No. 101–162, § 610, 103 Stat. 988, 1038 (1989) (prohibiting the use of Commerce Department funds to approve export licenses for launch in China or the Soviet Union). President Bush was able to avoid the scope of this statute in approving the launch AsiaSat on the Long March rocket, see *supra* note 91 and accompanying text, through the use of a substantial national interest exception. Kuckelman, *Regulation of Exports for Commercial Space Launches Outside the United States*, 38 FED. B. NEWS & J. 135, 138 (1991).

275. 22 U.S.C. §§ 2751–2796 (1988). For an in depth discussion of the AECA as it applies to satellite exporters, see Kuckelman, *supra* note 274.

Regulations (ITAR).²⁷⁶ The manufacture or export of items included on the ITAR Munitions List must be registered with the Office for Defense Trade Control (ODTC).²⁷⁷ Most satellites are included within the coverage of the Munitions List because they qualify as "inherently military."²⁷⁸ The export of items on the Munitions List is prohibited to certain countries,²⁷⁹ and export licenses are required for export to all other countries.²⁸⁰ Applications for export licenses under AECA are reviewed by the Department of Defense, as well as other interested agencies,²⁸¹ and occasionally by the Coordinating Committee on Multilateral Export Controls (COCOM).²⁸²

Since commercial communications satellites are specifically excluded from AECA coverage, their export must be analyzed under the Export Administration Act of 1979 (EAA).²⁸³ Section 4 of the Act establishes several types of licenses,²⁸⁴ and authorizes the Secretary of Commerce to compile a control list.²⁸⁵ An export may be prohibited for reasons of national security,²⁸⁶ foreign policy,²⁸⁷ or short domestic supply.²⁸⁸ The Secretary may not prohibit export of items on national security or foreign policy grounds if those items are readily available

276. 22 C.F.R. §§ 120-130 (1991).

277. 22 U.S.C. § 2778 (1988).

278. 22 C.F.R. §§ 120.3, 121.1(b) (1991). Non-military communications satellites are not included on the Munitions List, and therefore could fall under the coverage of the EAA and the COCOM Core list. *Id.*

279. 22 C.F.R. § 126.1 (1991). Included under the arms embargoes are most Communist countries, as well as those recently freed from Communist rule. Of possible launch providers, the prohibition includes the Soviet Union, but not China. *Id.* However, exceptions can be granted. *Id.* § 126.3.

280. *Id.* §§ 123.1 (unclassified defense articles), 125.2 (unclassified technical data), 125.3 (classified technical data and defense articles). Both defense articles and technical data are relevant to the export of satellites, since exporters will need to export the satellite and provide satellite mating and preparation services at the site of the launch. Kuckelman, *supra* note 274, at 136, 137. Proposals to sell significant military equipment on the Munitions List in excess of \$14 million (which includes most satellites) for use by the military of a non-COCOM government (except Iceland) also requires prior notification of the Office of Munitions Control. 22 C.F.R. § 126.8 (1991).

281. Kuckelman, *supra* note 274, at 136. Although review is based on a list of objective factors, it is done on a case by case basis and can easily be made subjective by the world peace and foreign policy exceptions. *Id.* at 137. Recently, particularly with regard to the launch of the AsiaSat in China, *see supra* note 91 and accompanying text, it appears that the Administration has added the consideration of the effect of the license on trade. Kuckelman, *supra* note 274, at 137-38. Such a calculus involves both the relation of the agreement to existing trade agreements, and the effect on the specific parties seeking to export. *Id.*

282. For a discussion of COCOM, *see infra* notes 295-99 and accompanying text.

283. 50 U.S.C. §§ 2401-2406 (1988).

284. *Id.* § 2403(a).

285. *Id.* §§ 2403(b), 2404(c), 2405(l).

286. *Id.* § 2404.

287. *Id.* § 2405.

288. *Id.* § 2406.

outside the United States.²⁸⁹ Short supply controls are not limited by foreign availability, but currently only include strategic resources.²⁹⁰ Under the EAA, countries are divided into seven different groups on which different export requirements are imposed.²⁹¹ Strategic items not on the Munitions List are included in the Commodity Control List (CCL),²⁹² which is divided into ten commodity groups.²⁹³ Items are classified according to the technical designations within the control list.²⁹⁴ Satellites are not specifically enumerated in the CCL, but satellite components could easily fall into one of the many technical categories contained therein, so the applicability of the EAA to a particular satellite would depend upon whether its components were included in the list.

Using these regulations, as well as those mandated by COCOM,²⁹⁵ the government has the potential to control the market availability of foreign launch services. The main purpose of COCOM is, or was, to control export of strategic items to the (former) Communist Bloc.²⁹⁶ China is given special "green line" treatment.²⁹⁷ There is a general license permitting exports of certain items to COCOM members,²⁹⁸ but satellites are not specifically listed, so their export even to COCOM members is probably controlled by EAA.²⁹⁹

289. *Id.* §§ 2403(c), 2404(f), 2405(h).

290. *Id.* § 2406.

291. Japan and Europe are included in the relatively liberal Group V, as is China (with restrictions), but the Soviet Union is included in the more strict Group Y. 15 C.F.R. § 770, Supp. 1 (1991).

292. *Id.* §§ 799.1(a), 799.1, Supp. 1 (1991).

293. *Id.* § 799.1(b).

294. *Id.* §§ 799.1(f), 799.1, Supp. 1 (1991).

295. COCOM is a voluntary organization that has no formal treaty or organization. Decisions on export controls are made unanimously on issues such as inclusion of items on its control list and granting of individual exceptions. COCOM also tries to coordinate enforcement efforts. COCOM includes the United States, Belgium, Canada, Denmark, France, Germany, Greece, Italy, Japan, Luxembourg, the Netherlands, Norway, Portugal, Turkey, and the United Kingdom. In the U.S., the Department of Commerce is responsible for enforcing COCOM regulations. Comment, *Curbing Illegal Transfers of Foreign-Developed Critical High Technology from CoCom Nations to the Soviet Union: An Analysis of the Toshiba-Kongsberg Incident*, 12 B.C. INT'L & COMP. L. REV. 181, 201-02 (1989). The rules and procedures of COCOM are confidential, so specific information about COCOM is very scarce. Hunt, *COCOM and Other International Cooperation in Export Control*, in COPING WITH U.S. EXPORT CONTROLS 1991 97, 104-05 (Practising Law Institute 1991). There is no official publication of COCOM core lists, which serve only as guidelines for the regulations of the member states. *Id.* at 106.

296. Hunt, *supra* note 295, at 106.

297. This constitutes a group of exceptions to the general COCOM guidelines which results in a significantly more liberal export regime with regard to China. *Id.* at 109.

298. 15 C.F.R. § 771.25 (1991).

299. It is possible this could change soon. A recent report prepared by an influential panel recommends that existing controls on trade with COCOM nations be significantly reduced. National Academy of Science, National Academy of Engineering, & Institute of Medicine, *Findings and Recommendations from Executive Summary of Report, "Finding*

Recently, however, U.S. export control policy has changed somewhat. President Bush has called for "higher fences around fewer goods."³⁰⁰ Certain telecommunication items will be included in the liberalization, but it is unclear whether the lowered restrictions will apply to satellites. Also included in the liberalization is "green line" treatment for the Soviet Union and Eastern Europe, similar to that accorded China.³⁰¹ Under green lining, COCOM imposes a level of technology below which case by case export licenses are not needed.

This liberalization of export controls will be accomplished by compiling a new COCOM Core List with accompanying changes in national regulations. An abbreviated Core List was approved by COCOM on May 23, 1991, and is to take effect by September 1, 1991.³⁰² The recently released fact sheet on the new Core List does not mention the degree to which satellites are covered,³⁰³ but an earlier U.S. proposal for the "core list" significantly decontrolled some types of rocket engines and "spacecraft", a generic term which should include satellites.³⁰⁴ Because the new list will be more specific than the previous list as to what items are controlled,³⁰⁵ it is possible that it could result in the exclusion of satellites if they are not specifically listed as controlled items. Although the new list may be successful in "building higher fences around fewer items,"³⁰⁶ many in industry are disappointed that the decontrols are not more significant.³⁰⁷

Since even the new export control laws might prevent export of satellites from the United States, the United States could use export controls as an instrument to protect domestic launchers,³⁰⁸ as Congress did with regard to China and the Soviet Union in 1990.³⁰⁹ However, the American satellite industry is as important as the launch industry,³¹⁰ and

Common Ground: U.S. Export Controls in a Changed Global Environment, reprinted in 8 Int'l Trade Rep. (BNA) 218, 221 (Feb. 6, 1991).

300. Pine, *U.S. Offers to Ease High-Tech Trade*, L.A. Times, May 3, 1990, at A1.

301. *Id.* at A9.

302. *U.S., COCOM Allies Agree on New "Core List" of Controlled Exports, Industry Disappointed*, 8 Int'l Trade Rep. (BNA) 800 (May 29, 1991) [hereinafter *U.S., COCOM Allies Agree*].

303. White House Fact Sheet on Core List of Controlled Exports by Industry Sector, Agreed upon by Coordinating Committee for Multilateral Export Controls (COCOM) in Paris May 24, 1991, reprinted in 8 Int'l Trade Rep. (BNA) 839 (May 29, 1991).

304. Fact Sheet on U.S. Core List Proposal to COCOM, reprinted in 7 Int'l Trade Rep. (BNA) 1526, 1527 (Oct. 3, 1990).

305. Lenorovitz, *Cocom Eases Restrictions on Export of High-Tech Equipment to Eastern Bloc*, AVIATION WK. & SPACE TECH., June 10, 1991, at 73.

306. *Id.*

307. *U.S., COCOM Allies Agree*, *supra* note 302, at 800-801.

308. However, predatory use of export control regulations would violate the spirit of Section 9 of the Commercial Space Launch Act Amendments of 1988. See *infra* note 315.

309. See *supra* note 274.

310. See *supra* note 124 and accompanying text.

to compete internationally satellite makers believe they must have access to all available launchers.³¹¹ Export controls should therefore be applied as loosely as possible without allowing sensitive technology to be transferred to undesirable countries. On-site monitoring of major launch sites by COCOM or American export control officials can assure that no leakage occurs.³¹² Controls should be used only to assure compliance with existing trade agreements.³¹³ This approach appears to have been reasonably successful in recent dealings with China³¹⁴ and might be the only way to influence the launch practices of recalcitrant countries.

E. GATT Services

The conclusion of some multilateral agreement on trade in launch services would be the most comprehensive way to regulate these services and prevent unfair competition by foreign launchers. Section 9 of the 1988 Amendments to the Commercial Space Launch Act instructs the President to conclude bilateral trade agreements in launch services with other space powers.³¹⁵ The United States has already concluded such an agreement with China,³¹⁶ and negotiations with the European Space Agency, Japan, and the Soviet Union are planned.³¹⁷ A series of bilateral agreements with the major launch powers could do much to assure a competitive commercial launch industry.

311. Hughes has strongly advocated such an open access policy. Asker, *U.S. Approval of Satellite Launches by China Not the End of Sanctions*, AVIATION WK. & SPACE TECH., Jan. 1, 1990, at 40. This is particularly important for countries far from the Equator, such as the Soviet Union, which is seeking to use Australia's Cape York facility. See *supra* note 110.

312. Hughes' export license to allow the recent launch of its satellites in China was conditioned on just this kind of arrangement. One dozen Hughes and military guards stood watch over the satellites during their stay in China to assure that U.S. regulations on technology transfer were not violated. Proctor, *supra* note 90, at 28. Since satellites are practically unrecoverable once in orbit, this type of monitoring would be sufficient to protect the technology and prevent its adverse use, so long as manipulation of controlled technology could not be achieved from a ground station.

313. Kuckelman, *supra* note 274, at 138.

314. *Id.* at 137-38.

315. Section 9 of the 1988 Amendments states:

It is the sense of the Congress that the United States should explore ways and means of developing a dialogue with appropriate foreign government representatives to seek the development of guidelines for access to launch services by satellite builders and users in a manner that assures the conduct of reasonable and fair international competition in commercial space activities.

Pub. L. No. 100-657, § 9, 102 Stat. 3900, 3906 (1988). This position should eventually lead to a U.S. position on trade in launch services; however, the government has yet to enunciate a program for international negotiations on launch services.

316. *Chinese Deal to Launch Arabsat*, *supra* note 94, at 25.

317. Kuckelman, *supra* note 274, at 135.

Because launch services have a relatively low priority in most countries' international trade policies,³¹⁸ a more comprehensive way to achieve international agreement on launch services and other low priority trade issues is to consolidate them in the GATT services negotiations currently under way in the Uruguay Round. This will allow the inclusion in the agreement of developing countries that do not presently have viable launch industries. Such countries would probably be hesitant to negotiate an agreement aimed specifically at launch services.

The GATT services negotiations have been underway since 1986, and were scheduled to conclude by the end of 1990.³¹⁹ The talks collapsed in December 1990, but have since resumed.³²⁰ The talks are expected to continue through 1992,³²¹ though they could conclude sooner.³²² President Bush has asked Congress to extend authorization of "fast-track" approval for GATT through June 1, 1993.³²³ This renews the possibility of achieving some success in services.³²⁴

There is also the possibility that some smaller version of the General Agreement on Trade in Services (GATS),³²⁵ will be concluded among

318. There are indications that this is changing. The United States, for example, has given trade negotiations regarding the space industry increased priority. See *Bush Issues Policy*, *supra* note 176, at 1371.

319. GATT Brief: *Centre Stage for Services?*, *ECONOMIST*, May 5, 1990, at 88 [hereinafter *GATT Brief*].

320. *President Bush Set to Ask Congress to Extend 'Fast-Track' Authority as GATT Talks Resume*, 8 *Int'l Trade Rep.* (BNA) 295 (Feb. 27, 1991).

321. *Uruguay Round Negotiation back on Track as Participants Agree to Tackle Farm Trade*, 8 *Int'l Trade Rep.* (BNA) 294 (Feb. 27, 1991).

322. *USTR Hills 'Delighted' EC Now Prepared to Negotiate, but EC Sees No Breakthrough*, 8 *Int'l Trade Rep.* (BNA) 881, 882 (June 12, 1991). GATT delegates were to hold a result-oriented "work program" during June and July 1991 in an attempt to speed negotiations. *GATT Director General Unveils Work Plan For Uruguay Round over Next Two Months*, 8 *Int'l Trade Rep.* (BNA) 897 (June 12, 1991).

323. *President As Expected, Requests Extension of 'Fast-Track' Trade Authority Until 1993*, 8 *Int'l Trade Rep.* (BNA) 340 (Mar. 6, 1991) [hereinafter *President Requests Extension*]. Under "fast-track" approval, Congress cannot amend the agreement, rather it can only vote "yes" or "no." *Id.* Although there is heavy opposition in Congress to extending "fast track" and the President predicts a "tough fight," *Rep. Dorgan Introduces Resolution Opposing President's Bid for Fast-Track Extension*, 8 *Int'l Trade Rep.* (BNA) 342 (Mar. 6, 1991), it is supported by some key members of Congress. *President Requests Extension, supra* at 340.

324. There is reason for optimism about the chances for a services agreement unless the entire Uruguay Round collapses. Hindley, *supra* note 232, at 130. The ultimate success of the Uruguay Round as a whole probably depends on the granting of fast-track authority by the U.S. Congress, *EC Ministers Say Uruguay Round Progress Must Wait Until U.S. Fast-Track Decision*, 8 *Int'l Trade Rep.* (BNA) 576 (Apr. 17, 1991), and some compromise by the European Community on agriculture. *USTR Hills Opposes Setting New Deadline in GATT Talks Until EC Moves on Agriculture*, 8 *Int'l Trade Rep.* (BNA) 600 (Apr. 24, 1991).

325. The GATS negotiations, though part of the Uruguay Round, have been formally separated from the GATT framework. Negotiators are to report through the Trade Negotiations Committee (TNC), rather than to the Group of Negotiations on Goods. Randhawa, *Punta del Este and After: Negotiations on Trade in Services and the Uruguay Round*, *J. WORLD TRADE L.*, Aug. 1987, 163, 164.

thirty to forty countries even if an agreement including the over one-hundred members of GATT fails.³²⁶ Whether such a limited agreement would be of benefit to the launch industry is uncertain, however. An agreement limited to the developed country members of the Organization of Economic Cooperation and Development (OECD)³²⁷ would include the major launch competitors—Europe, Japan, and the United States—but would leave out marginal competitors such as the Soviet Union and China. As these countries begin to increase their presence in the commercial launch market, other competitors will need some forum in which to address the competitive practices of these launchers. Since these countries are seeking membership in GATT,³²⁸ they may be more easily coerced into joining GATS as well, thereby achieving greater coverage of world services.³²⁹ To assure the inclusion of other launchers not involved in the GATS negotiations, the United States should insist that membership in GATT be conditioned on GATS membership as well.

It is still too early in the restarted round to predict what kind of agreement will be produced, but the most comprehensive proposal to date is the U.S. proposal,³³⁰ which adopts several of the cornerstones of GATT as the basis for the services agreement. Article 8 of the proposal provides for national treatment of service providers, except to the extent "necessary for prudential, fiduciary, or health and safety reasons."³³¹ Article 7 applies national treatment to licensing, requiring that licensing

326. *GATT Brief*, *supra* note 319, at 88–89.

327. The OECD's main purpose is to encourage economic cooperation among its members, which include Germany, Belgium, Austria, Canada, Denmark, Spain, the United States, France, Greece, Ireland, Iceland, Italy, Luxembourg, Norway, the Netherlands, Portugal, the United Kingdom, Sweden, Switzerland, Turkey, Australia, Finland, Japan, and New Zealand. The binding force of OECD agreements comes more from political pressure than from a formal obligation under international law. Audretsch, *Supervision in the EEC, OECD, and Benelux—A Difference in Degree, but Also in Kind?*, 36 INT'L & COMP. L.Q. 838, 844–49 (1987).

328. *Soviet Union Access to Antidumping Committee Another Step Toward Full Membership in GATT*, 8 Int'l Trade Rep. (BNA) 696 (May 8, 1991); *GATT Rejects New Chinese Membership Bid, Requests More Data on Trade Liberalization*, 7 Int'l Trade Rep. (BNA) 1477, (Sept. 26, 1990).

329. This is a general concern shared by all services industries. An OECD agreement would exclude newly industrialized countries (NICs), which are providers of some important services. American companies in these areas, such as Bechtel and other members of the Coalition of Services Industries (CSI), are adamant in their belief that a services agreement must include all GATT members. *Yeutter Reaffirms U.S. Desire to Reach Accord at Uruguay Round Midterm Review in December*, 5 Int'l Trade Rep. (BNA) 1002, 1003 (July 13, 1988).

330. Office of U.S. Trade Representative, U.S. Proposal for a General Agreement on Trade in Services and U.S. Submission to GATT Negotiators on Agricultural Reform, *reprinted in* 6 Int'l Trade Rep. (BNA) 1391 (Oct. 25, 1989) [hereinafter U.S. Services Proposal].

331. *Id.*, Art. 8.2.1, at 1392. Even this exception to national treatment is limited to situations in which it is "equivalent in effect to the treatment accorded by the Party to its own persons in like circumstances." *Id.*, Art. 8.2.2, at 1392.

and certification be based on competence,³³² and that it not be used to discriminate against foreign providers.³³³ Another GATT cornerstone, general non-discrimination, is also required by the U.S. proposal, giving the agreement an analogue to "most favored nation" (MFN) status.³³⁴ For the commercial launch industry, MFN status or national treatment is achieved by allowing satellite owners to export their satellites to the launchers of their choice. The basics of implementing such a policy are therefore much less complicated than for other service sectors. This simplicity will be undercut if states are allowed to use the health and safety exception³³⁵ too freely, particularly if it were to be used to justify the imposition of export controls by the United States.

Although the proposal allows for the maintenance of existing domestic regulations,³³⁶ it requires "transparency," a term of art meaning that regulation of covered industries, be it judicial, legislative, or administrative, be promptly published, and that in all review of foreign services, the foreign provider be kept apprised of the status of its case or application.³³⁷ The proposal also provides for a standing committee on services³³⁸ and for dispute resolution procedures.³³⁹

The American GATS proposal would include many services, but allows for the exclusion of some sectors. Rather than allow countries to include specific industries within the GATS framework, the U.S. proposal

332. *Id.*, Art. 7.1, at 1392.

333. *Id.*, Art. 7.2, at 1392.

334. *Id.*, Art. 9, at 1392. National treatment puts foreign service providers on an equal footing with domestic providers, whereas most favored nation status allows for discrimination against foreign service providers so long as all foreign providers are treated the same. The European Community's most recent services proposal, which is in many ways similar to the U.S. proposal, places more emphasis on "national" treatment as an important element of the GATS agreement. EC, in *Effort to Speed up Talks, Submits Draft Agreement on Trade in Services at GATT*, 7 Int'l Trade Rep. (BNA) 893, 893 (June 20, 1990) [hereinafter *EC Submits Draft Agreement*].

335. See *supra* note 331 and accompanying text.

336. U.S. Services Proposal, *supra* note 330, Art. 11, at 1392. The proposal further requires that all future regulation be in accord with GATS. *Id.* The liberalization of existing regulations is likely to be the province of future GATS negotiating rounds, in much the same way as they are presently negotiated under GATT. *GATT Brief*, *supra* note 319, at 88.

337. U.S. Services Proposal, *supra* note 330, Art. 12, at 1392. In addition to transparency of regulations, GATS might also involve attempts to harmonize various national regulations over time. Hindley, *supra* note 232, at 133-134.

338. U.S. Services Proposal, *supra* note 330, Art. 18, at 1394.

339. *Id.*, Art. 19, at 1394. Recently the Office of the U.S. Trade Representative has indicated that it desires cross-retaliation provisions in GATS to go beyond more formal dispute resolution procedures. *U.S. Supports Cross-Retaliation*, *supra* note 232, at 1111. Cross-retaliation procedures set standards which allow signatories to impose retaliatory tariffs or other barriers when another signatory commits violations of the Agreement. *Id.* It is unclear from the text of the U.S. proposal whether cross-retaliation will be extended only for violations in services trade, or whether there will be cross-retaliation between goods and services sectors. Hindley, *supra* note 232, at 142.

requires an "opt out" approach, in which every excluded industry must be specifically included in an annex for each signatory.³⁴⁰ Whether launch services would be included in the coverage of GATS or be opted out remains to be seen. The United States has expressed its desire to include telecommunications under a separate annex,³⁴¹ and launch services are the kind of strategic industry many countries might be inclined to exclude. Article 16.1 of the U.S. Services Proposal³⁴² allows countries to exclude services when necessary for national security. Other countries have also expressed concerns over GATS coverage of industries vital to national security, cultural independence, or technological development.³⁴³ The U.S. proposal also allows exceptions for government procurement,³⁴⁴ and allows countries to limit government aid to domestic services providers.³⁴⁵ Both of these provisions have the potential to be problematic for U.S. commercial launchers should foreign governments abuse the government procurement and subsidization exceptions, but they could also be helpful if governments take a managed approach.

The European Community (EC) also presented general counter-proposals meant to challenge areas of weakness in the U.S. draft. The main thrust of the EC proposal is to define services in very broad terms in order to prevent the exclusion of transportation and telecommunications implied by the U.S. proposal.³⁴⁶ The European proposal has important

340. U.S. Services Proposal, *supra* note 330, Art. 2.2, at 1391. Each service will be discussed on a sector-by-sector basis, with each country making its own decision whether or not to opt out for a particular sector. *U.S. Presents "Bold" Proposal Before GATT Services Meeting, USTR Hills Tells Reporters*, 6 Int'l Trade Rep. (BNA) 1368, 1369 (Oct. 25, 1989) [hereinafter *U.S. Presents "Bold" Proposal*]. Fifteen sector negotiating groups have already been formed and asked to submit drafts. *U.S. to Present Services Proposal at GATT Next Month, Administration Officials Say*, 6 Int'l Trade Rep. (BNA) 1153 (Sept. 13, 1989) [hereinafter *U.S. to Present Services Proposal*]. If a country believed that another country had excluded too many sectors from GATS coverage, it could withhold benefits from the offender through a "non-application" clause. *U.S. Presents "Bold" Proposal, supra*, at 1369. The U.S. remains adamant in its support for this kind of reciprocal agreement. *U.S. Insists on Right to Withhold MFN as Part of Broader GATT Services Accord*, 8 Int'l Trade Rep. (BNA) 317 (Feb. 27, 1991). American negotiators hope that such a scheme will not lead to a "cafeteria plan" agreement, in which every country is allowed to pick and choose which services to include and which countries to grant reciprocity, but even a cafeteria plan agreement is preferable to no agreement on services. *U.S. to Present Services Proposal, supra*, at 1153.

341. *U.S. Presents "Bold" Proposal, supra* note 340, at 1368.

342. U.S. Services Proposal, *supra* note 330, Art. 16.1, at 1393.

343. Nayyar, *Some Reflections on the Uruguay Round and Trade in Services*, J. WORLD TRADE L., Oct. 1988, 35, 46-47.

344. U.S. Services Proposal, *supra* note 330, Art. 8.3, at 1392.

345. *Id.*, Art. 8.4, at 1392.

346. The EC proposal provides for all services to be brought within GATS without any opportunity to exclude strategic industries. *TNC Opens 'Make-or-Break' Session with some Progress Seen in Agriculture Discussions*, 7 Int'l Trade Rep. (BNA) 1141 (July 25, 1990). The proposal also allows for cross border flows of both service providers and costumers. EC

implications for the commercial launch industry because it is a sector that would likely be excluded from the agreement if either telecommunications or transportation were excluded. The breadth of the European proposal is also important in that it binds the EC to include launch services in GATS, something they might otherwise be disinclined to do given Ariospace's reliance on government support. The main drawback of the EC proposal is that it provides for a "relative reciprocity" approach, which allows a country to withhold benefits of GATS to countries it believes have not entered into the same level of commitment as the withholding state.³⁴⁷ This approach could lead to differences of treatment within GATS, and possibly to squabbles between countries alleging discrimination.

Initially, most countries reacted favorably to the U.S. proposal, including the Group of Ten, ten developing countries led by India and Brazil.³⁴⁸ Along with other developing countries, the Group of Ten had earlier insisted on the inclusion of labor flows in services, and relative reciprocity for developing countries.³⁴⁹ Although developing countries are abandoning their previously recalcitrant positions on some issues,³⁵⁰ and accepting, with some modifications, the U.S. proposal's exception for balance of payment reasons,³⁵¹ they are still lobbying for a more territorial approach to services than the U.S. and EC proposals.³⁵² These differences do not have a significant impact on the area of launch services, however, because they involve the movement of consumers, an area on which all sides agree.³⁵³ The issue of the movement of service providers and factors of production is more contentious.

GATS is by no means a panacea for the launch industry or the services sector in general. Many stumbling blocks remain, such as the

Submits Draft Agreement, supra note 334, at 893. Lately, however, the EC has wavered on its insistence that all services be included. It intimated that it would accept the exclusion of shipping from GATS, although other transportation services still appear to be part of its proposal. *EC Now Prepared to Exclude Shipping from New GATT Agreement, EC Official Says*, 8 Int'l Trade Rep. (BNA) 47, 47-48 (Jan. 9, 1991).

347. Hindley, *supra* note 232, at 136-137 n.3.

348. Nayyar, *supra* note 343, at 35. India gave an official assessment of the U.S. proposal, and gave its conditional support so long as the interests of developing countries were ultimately recognized. Brazil, Yugoslavia, and Tanzania all expressed their concurrence with the Indian delegation's assessment. *U.S. Presents "Bold" Proposal, supra* note 340, at 1369.

349. *Australian GATT Plan Draws Positive Reaction but Objections Raised to Mexican Proposal*, 5 Int'l Trade Rep. (BNA) 1067 (July 27, 1988). See also Nayyar, *supra* note 343, at 40-41.

350. *GATT Brief, supra* note 319, at 88-89.

351. U.S. Services Proposal, *supra* note 330, Art. 15, at 1393.

352. The less developed countries would allow free international flows of service customers, but would be more restrictive in allowing foreign service providers to establish themselves within their countries. Hindley, *supra* note 232, at 139.

353. Both Brazil and Cameroon, in the two major proposals of developing countries, provide for cross-border flows of consumers. *Id.*

treatment of financial services,³⁵⁴ professional services,³⁵⁵ cultural industries,³⁵⁶ and existing international regimes in telecommunications and transportation.³⁵⁷ Furthermore, GATS breaks new ground in international regulation of trade since regulation of services requires regulation of providers rather than of goods.³⁵⁸ This is an ambitious incursion for international law, which has traditionally kept out of the internal affairs of nation states. The most important contribution that GATS could make is to provide a framework for regulating trade in services through which further progress in launch services could be achieved.

V. CONCLUSION

Given the present successes of the domestic launch industry, a non-interventionist approach would probably be of most benefit to the industry. The United States has the strongest aerospace industry in the world, as demonstrated by American dominance in commercial aviation, and it is likely that both American satellite producers and launch providers will benefit greatly from free trade in launch services. Attempts to give one industry an international advantage could cause corresponding harm to the other.

The government would also benefit from non-intervention. Because of budget cuts, extensive expenditures for the launch industry are impractical. Moreover, the general governmental trend over the last decade has been one of deregulation domestically, and of championing trade liberalization internationally. In order to maintain its image as an

354. Applying liberal trade policies to financial services may not benefit countries concerned with debt management. *Participants in Uruguay Round of Talks Generally Agree Services Pact is Needed*, 6 Int'l Trade Rep. (BNA) 1227, 1227-1228 (Sept. 27, 1989).

355. The licensing of doctors, lawyers, architects, and other professionals can be very controversial, since every country has its own concepts of professional competence and responsibility, which often outweigh purely economic considerations. The World Union of Professions (UMPL) contends that the professions conflict with market forces and would be greatly hurt by deregulation. *World Professions Union Calls for Special Treatment in GATT Negotiations on Services*, 6 Int'l Trade Rep. (BNA) 1355 (Oct. 18, 1989).

356. *U.S. to Present Services Proposal*, *supra* note 340, at 1153.

357. The International Telecommunications Union (ITU) currently controls much of the regulation of international telecommunications, Nayyar, *supra* note 343, at 41, and might resist a GATS incursion into its regulatory realm. The transportation industry is also governed by several agreements, such as the UNCTAD Code of Conduct for Liner Conferences for shipping and the IATA for aviation. *Id.* See *supra* notes 190-91 and accompanying text. See also *EC Proposes Rules for Negotiating Liberalization of Trade in Services*, 6 Int'l Trade Rep. (BNA) 989 (July 26, 1989); *U.S. Presents "Bold" Proposal*, *supra* note 340, at 1369.

358. Randhawa, *supra* note 325, at 170. Because producers of services are involved, the collateral concerns of labor flows and investment would also be affected by a services agreement. See Nayyar, *supra* note 343, at 37. See also Hindley, *supra* note 232, at 131-135. Setbacks in either of these areas could slow progress in services trade as well.

advocate of free trade, the Administration will need to abstain from saber-rattling with the U.S. trade laws.³⁵⁹ The government cannot sit idly by, however. Some measures are needed to safeguard the competitiveness of domestic commercial launchers.

Present U.S. trade regulations do not adequately address the problems inherent in services trade, let alone those of the launch industry. Those provisions that do touch on unfair service practices, such as "Super 301," do so only in the context of a more general, broad-based pattern of unfair trade practices. The remedies imposed by "Super 301" are retaliatory rather than conciliatory, and can potentially tarnish the United States' reputation as a free trader.³⁶⁰ The United States should therefore rely on private petitioners to uncover unfair trading practices,³⁶¹ and should act against foreign practices only when both the commercial launch industry and the government are in agreement about the unfair nature of the foreign practice at issue. Although efforts at brinksmanship have thus far been relatively successful, at least with regard to recent improvements in U.S.-Japan trade policy,³⁶² they lead to bilateral solutions, which invariably leave important players out of the picture.

Liberalization of export controls should also continue. Because American industry is on both sides of the launch transaction, restraints on the free movement of satellites can only hurt domestic launchers and satellite producers.³⁶³ Most launching states have stated that they respect the proprietary nature of the technology involved, and will make no attempts to expropriate it. Safeguards for foreign launches can be accomplished at a minimal additional cost, considering the high basic cost of each launch.

Other governmental measures, such as export targeting, require increased expenditure, and could lead to inefficiency. Indeed, a highly competitive policy of export targeting could cost the government huge amounts of money, with the benefits accruing mostly to foreign satellite users.³⁶⁴ American industrial policy efforts in this area should instead concentrate on policies that are likely to benefit domestic launchers without harming domestic satellite producers. The United States has for many years had a *de facto* industrial policy with regard to the defense industry.³⁶⁵ Although some budget cuts are unavoidable, the

359. See *supra* notes 204-71 and accompanying text.

360. See *supra* notes 258-60 and accompanying text.

361. Now that NASA is no longer active in the commercial launch industry, a future 301 petition might not suffer the same fate as the 1984 Transpace petition. See *supra* notes 261-63 and accompanying text.

362. See *supra* note 264 and accompanying text.

363. See *supra* notes 272-314 and accompanying text.

364. See *supra* note 157 and accompanying text.

365. See *supra* note 155 and accompanying text.

government should attempt to transfer some of the savings from defense programs into modest civilian programs.

The subsidies need not be direct, however. A simple change in defense and civilian space policy to use a greater number of ELVs should give the commercial launch industry the economies of scale necessary to compete effectively. The Defense Department will be needing increased satellite capabilities as earth-based forces are reduced. Any procurement program should be aimed at allowing commercial launchers to develop economies of scale.³⁶⁶ This is the type of industrial policy that has worked best for the United States in the past. NASA can also contribute, albeit on a smaller scale, by reevaluating its manned mission policy. Such a reevaluation would give ELVs increased government business and reduce the possibility of another tragic shuttle accident.

A policy of non-intervention will not be successful if the United States cannot convince other nations to go along. A recent statement by USTR Carla Hills reflects this thinking: "There's a concern at home that our market is open and that the rest of the world is closed, and there's no enthusiasm for freezing the issue this way in the Uruguay Round."³⁶⁷ This is especially true in the area of launch services.

Some international regime is needed to prevent predatory behavior by foreign, government-financed launchers. A cartel arrangement would be hard to administer and would lead to difficulties in both international and domestic allocation of capacity,³⁶⁸ and it would run counter to a policy of non-interventionism. Liberalizing world trade in services through the GATS negotiations is a far better alternative. This would allow American competitive advantages to be fully exploited and would reward only those firms that could compete effectively. It would also provide some modicum of international oversight to the commercial launch industry, and provide the United States with a means of redress against unfair foreign competition.³⁶⁹ A free trade regime, coupled with governmental awareness of the needs of the commercial launch industry, is all the industry needs.

366. See *supra* notes 173-77 and accompanying text.

367. Hills Calls U.S. Textiles Position Flexible, Hints at Possible Break in Agriculture Talks, 7 Int'l Trade Rep. (BNA) 1427, 1428 (Sept. 19, 1990)

368. See *supra* notes 190-203 and accompanying text.

369. See *supra* notes 330-47 and accompanying text.

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369. See *supra* notes 330–47 and accompanying text.

